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PIAGET FOR REGULAR AND SPECIAL PHYSICAL EDUCATORS AND RECREATORS

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PIAGET FOR REGULAR AND SPECIAL PHYSICAL EDUCATORS AND RECREATORS

Papers selected from the National Symposium on Piaget for Regular and Special Physical Educators and Recreators, State University College, Brockport, New York, 14420, October 7-9, 1974.

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FOREWORD

Historically educators and psychologists have sustained an interest in motor development during early childhood as a part of their interest in the normal physical, social-emotional and intellectual maturation process of the pre-school child. Recently, there has been a quickening and redirection of interest to focus on the significance of early motor development in children. Much of the focal point on interest and theory have centered on the importance of movement as a learning experience and its possible contribution to cognitive development particularly in the education of the preschooler, the handicapped child and the underachiever.

With this upsurge of interest came an inundation of literature and research reporting sweeping claims regarding the value of selected movement programs in enhancing cognitive skills. Interestingly enough it was the non-physical educators, for the most part, who were developing these diverse perceptual motor programs and it was the school psychologists, counselors and reading specialists who were calling for the initiation of these programs in the elementary schools. Before long there was a mushrooming of sensorimotor, visual motor and perceptual motor programs in the schools based upon a number of disparate theories. The implementation of these programs, however, was left to the physical educator – a job he was ill prepared to carry out.

In the rush to catch up, the physical educators across the country surveyed the proliferation of confusing literature and attended endless "how to do it" demonstrations which appeared at practically every convention or short term clinics and workshops. At times this led to further confusion for the physical educator for he often did not understand the basic assumptions or educational theories undergirding the demonstrations and recommended educational programs and methods. What soon developed were eclectic programs lacking sound scientific foundations.

In the late 60's in an effort to aid the physical educator, the American Alliance of Health, Physical Education, and Recreation conducted several conferences which attempted to examine the scientific foundations used to guide the development of logical school programs to enhance perceptual motor development.

Now in the 70's it was felt by some that what was really needed was to get past the "secondary source syndrome" of examining the perceptual motor theories and look to the pure cognitive theorists for insight into the nature and direction of intellectual development.

And so it was that a theoretical symposium was planned which would examine the works of one cognitive theorist in searching for the role of movement in the cognitive development of the young child. The work of Jean Piaget which has stood as an unsurpassed milestone in the study of cognitive thought was chosen for the first symposium. If practice and research should stem from a foundation of theory, then by examining Piaget's concepts relative to the development of cognition, a generation of new ideas for practice and research might be forth coming. This was the goal of a National Symposium of Piaget for Regular and Special Physical Educators and Recreators held at the State University of New York College at Brockport, October 7, 8, 9, 1974.

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PIAGET: OVERVIEW AND PERSPECTIVES

H. Larry Humm

INTRODUCTION

On Backing Into An Impossible Task

The purpose of this paper is to build a background in Piaget's theory that will serve as a starting point for the papers that compose the bulk of this conference. At one time I had hoped that I could construct an umbrella to cover the range of the conference. However, the variety of topics and the number of approaches encompassed in the papers necessitated a very strange looking umbrella. Therefore, for the sake of aesthetics, references to specific papers have been omitted in this overview. The purpose of building background will probably be served better by providing a point of view directed at clarification of some of the issues related to the application of Piaget for regular and special physical educators. The resulting overview should provide a framework that will be supportive of the topics to follow.

Summarizing Piaget's monumental work is no small task. Flavell's (1963) bibliography lists ninty-four works of which Piaget is sole author and fifty with joint authors. Obviously some choices must be made, some precious ideas omitted. Also, application of Piaget's ideas to practical tasks is a frustrating exercise. His intent is the study of knowledge and how knowledge emerges. Although the content of his works is seductively germane to our educational tasks, the approach he takes to his study seldom directly fits what we want to know. We must not only condense, we must also extrapolate.

Functional Invariant: A Look at the Nature of the Beast

Any study of man (or child) presupposes that some legitimate generalization can be made betwsen individual members of the species. If each is different, then we are limited to a psychology specific to specific individuals. Piaget suggests that there are two functional invariants that serve to unite the behavior of all humans. Their existence does not vary from individual to individual. They are defined by the functions they serve (rather than their biological basis). These invariant functions are adaptation and structure, and they are in operation from the time of birth.

Adaptation:

Piaget's background as a biologist prepared him for a view of man as an adapting beast. We must meet problems as they arise or we will no longer survive. For mankind, adaptation is probably more than mere survival. White (1959) argues well for the concept of coping EFFECTIVELY, the basic need to meet our problems with sufficient flair to feel competent in our interaction with the world. Piaget places this form of adaptation as a central characteristic of man's existence. Every act of intelligence is seen as an act of adaptation, a coping, with some problem (however minor) encountered in a constant interaction with a changing world

There are two processes that accomplish adaptation: assimilation and accommodation. Assimilation is the bending of reality to fit one's structure. One has a concept, an expectation. When confronted with a situation related to that concept, the situation is interpreted within the framework of that concept. I once met a very charming person at a cocktail party. I was very impressed, you might say "snowed". Later, in another context, I watched this person severely berate an individual of questionable intelligence. It was not difficult to interpret ire as clever, criticism as witty, and I must admit, the delivery had a certain charm of its own. Reality matched what I knew to be true.

Accommodation, on the other hand, is a bending of one's structure to fit a reality event. There comes a time when new information is so compelling that one can no longer maintain an old concept. I mentioned I was impressed with this acquaintance. Apparently this was a unilateral respect. When the ire was directed at me it was neither clever nor witty, and it was delivered with such awkwardness as to be totally without credibility. Phoney! An obvious phoney!

Occasionally individuals suffer from a preponderance of either process, and the result is seldom positive. The constant assimilator is rigid. Nothing, no information or argument, is sufficient cause for changing a concept. If the Parent Teacher's Association is a communist front, then the fact that they hold elections and voted against Marxist books is only indicative of how clever a communist front organization can be. The constant accommodator, on the other hand, is silly putty. Truth is a function of the last argument encountered. A conservative at breakfast, a liberal at noon. Instability, constant change, is a way of life. Normally we have a balance between assimilation and accommodation. Assimilation provides for stability, so that every new experience does not result in confusion. Accomodation provides for change and growth.

Structure:

You may have noted that the definitions for both assimilation and accomodation assume an underlying psychological structure. . .an ongoing, constantly changing set of concepts and expectations. An organization of memory emerges as each experience is interpreted and fitted into the existing organization. Reality, and its interpretation, is dynamic. You will not be exactly the same person an hour from now (unless you are asleep?).

Structure involves more than the dynamic organization of memory. Piaget refers to a basic "need" for organization. We cannot perceive the world as random. Even when you tell subjects in an experiment that events are random; they look for, and think they are finding, order. Gamblers constantly seek a system where no system has a right to exist. System and random events are mutually exclusive. Yet by imposing a structure to events, the child can construct a stable pattern of interaction; this is, the child can construct the means for effective coping.

As the child's adaptations to his environment emerge into a psychological structure or organization of schema for interaction, a hierarchy develops. Complex behaviors grow out of simpler skills. Four reflexes get combined into one streamlined, coordinated system for nursing. A basic reflex for grasping with palmer stimulation comes under voluntary control and then is combined with

eye-hand coordination to allow grasping. This skill, in turn, is combined with an adaptation of grasping to small objects and the pinching necessary to pick up a dropped pin emerges. Each skill is built upon an already modularized existing skill.

With many of the more salient skills, the sequence of development does not vary considerably from child to child. This ordinality can be understood in the context of hierarchial structures. If B is built upon A, then A must exist before B can develop. For instance, the child will not search for a missing object until he knows the object continues to exist when it is out of sight. If some behaviors are prerequisites for others, it would appear that an ordinal sequence is the only possible developmental model. Piaget's stages are ordinal, being a description of a progressive hierarchy of schemes for coping with the environment.

OUTLINE OF STAGES: DESCRIPTION AND A BIT OF TASK ANALYSIS

Again, may I remind you that my task here is one of condensation and extrapolation. What is to follow is a mere outline, drawing only upon those features of Piaget's vast observations which seem most appropriate in this context. An intense suspicion of the dangers of oversimplification compels me to warn those who are new to Piaget that there is much that lies beneath the surface.

Sensori-Motor Period

The neonate has virtually no control of his motor system; he is like a puppet whose strings have become entangled, all parts move when one part moves. There is no reason to assume that the neonate knows anything about the nature of the environment he has been thrust into. Also, the relationship between movement impulses from the brain and changes in the "outside" world seem to allude the infant.

Yet, any but the most immature adaptations require voluntary movement, separation of self from non-self, understanding of the nature of objects in the outside world, and a basic understanding of how movement effects the world. The development of these crucial abilities forms the foundatin for all future physical and intellectual activity. The sensori-motor period, with its concentration upon the interaction between movement and perception, provides this needed foundation.

Without going into a detailed description of the substages (there are six) of the sensori-motor period, let me suggest two observations relevant to our purpose here. The first has to do with active feedback, and the second with the child scientist.

The accommodation process is totally dependent upon feedback providing information about the result of a behavior (either overt or covert). Adaptation is necessary only when there is an imbalance between the existing psychological structure and the perceived condition of reality. Accommodation of movement (or concept) results when the operation prescribed by the structure does not meet the demands of the goal. Feedback allows for comparison of goal with reality and thereby defines the need for accommodation. It follows that feedback is an essential condition for growth to occur.

A close analysis of early adaptation demonstrates a principle that seems to hold true throughout the developmental sequence. The fact that an organism comes with the capability for eliciting a behavior is not sufficient for that behavior to develop. The fact that an environment supports a behavior is no guarantee of its emergence. Mere interaction of organism and environment appears to be insufficient for growth. There must be a particular character to the interaction of organism and environment: the child must be in active control of the interaction. Held (1965) demonstrated this phenomenon with newborn kittens and with humans in novel visual environments. Those who are moved passively in the environment do not adapt as well as do those who are in control of their movement. The child is an initiator, and this is a critical point. We cannot learn for the child, we can only hope his environment is structured in a manner that supports his learning.

When observing the active learning of the rapidly developing infant, one must be struck with the fantastic amount of information the child acquires in a relatively limited time span. Yet this acquisition is a task of sheer joy. The child discovering the magic of breakfast cereal disappearing when he separates thumb from forefinger displays a rapt attention that would overwhelm any physics professor lecturing on gravity. The child's mother, who understands gravity better than she understands her child, understandably fears a touch of infantile sadism as she watches her darling repeatedly dropping food to the floor. The matter gets worse as the child enters the subperiod of Tertiary Circular Reactions (12-18 months). Now he begins to vary his experiment: first dropping the cereal in front of him, then to the side, and then to his lap. Each drop is followed by observation, and some are followed by surprise when the cereal fails to fall where expected.

This process of discovery is very much the same as that of any scientist attempting to discover the principles that rule the workings of the world. We adults take so much for granted that we loose sight of the enormous task of discovering even the simplest concepts relating to self, objects, time, space, and movement. In failing to "think naive", we also fail to appreciate that the child manages to make the necessary observations and draw conslusions long before it occurs to us to tell him what we want him to know (as if it would serve any purpose to demand that the infant learn about gravity).

Preoperational Period (2-7 years)

Once the child has basic control of his actions and understands the rudiments of how he operates on the world, he is ready for the next major task. Except for during the very last substage, the sensori-motor child is limited almost entirely to action oriented thought. Conceptual development, imitative learning, language, and many other demands of the adult world require an ability to move beyond action to an internal representation. Even in relation to action, internalized preplanning and anticipation become more and more important for judgment. The next step in the hierarchy, then, is building some facsimile of the outside world inside the child. The development of language is only part of this internalization. Also important is the emergence of abilities such as deferred imitation. The child develops the ability to see an action at one point in time,

store that information in memory without overtly performing the act, and finally, at a later time to imitate the act. Deferring a remembered activity requires some means of holding a representation of that act in memory until its use is called for.

Although internal representations grant the young thinker freedom from overt exploration, they also present a new set of problems to be dealt with during the last part of the preoperational period. Every experience the child has had been "real". Experience happens. With the advent of an internal reality, the real becomes subjective. Little Jane screams in fear from her nightmare, and we tell her it was not real. Johnny dreams he has a pony and wakes to find there is none. There is something very peculiar about these experiences.

Likewise, the sun is called the sun because you look at it and see it is the sun. The name sun has a reality as concrete as the visual experience. It is no wonder that preschoolers are either amused or indignant when you call them by the wrong name. If you only look, you can see that I am Larry. Realism is one of the hallmarks of the later preoperational child. It effects his entire frame of reference, including his moral judgement and his view of rules of the game.

As long as experience is so real, then everyone must share the same experience. Realism and egocentrism are very closely related. The child assumes (and why not?) that what he knows, everyone knows. He needs do little more than think, and the rest of the world has the same experience of thought he has had. Robert Krauss once observed two children attempting to build identical block towers without seeing one another. One child selected a block and said, "And now put on this one." The second child (without seeing the first, or which block he was holding) looked around for a minute, picking up a block and inquired, "This one?" The response was a very certain, "Yes". Each child was very certain what "This one" meant, neither was capable of realizing that the other did not. By the way, I am told that this egocentric assumption in communication is not limited to children.

The preoperational child weighs the reality of the immediate situation much more heavily than does the older child. Piaget explains this behavior as a dominate of perceptual judgement over conceptual judgement. When two equal sized glasses with equal amounts of water are poured into unequal sized glasses, the preoperational child makes a non-conservative judgement and says that the amount of water is now unequal. The older child admits that one looks like more water than the other because it is taller, but the pouring of water does not change the amount of liquid. The ability to separate "looks like" from "is" requires not only a body of concepts to temper judgements, but also an ability to decenter from immediate experience. Again, a move away from rigid realism toward a more flexible subjectivism is characteristic of growth beyond the preoperational level.

You will note the importance of the term "operational" in Piaget's outline: preoperational, concrete operational, and formal operational. This is not operational in terms of "working". Rather, it refers to the means of performance, the operation. Operations are internalized general actions, not specific to any particular external behavior. Operations are concepts of action. For example, the ability to order elements along some continuum is an

operation that can refer to size, color, brightness, weight, time, or any continuum that can be ordered. It is non-specific to a particular task. Again, note that we are moving further from the concrete, further from the specific, as the child develops operations.

The preoperational child has operations. BUT they are neither consistent nor reliable. The first substage (Preconceptual, 2-4 years) is one in which the child forms collections of specifics. Collections are loosely defined operations or concepts. These collections are specific because generalization abilities are quite limited, and when generalization exists, it borders on the ideosyncratic. The preconceptual substage builds the necessary internalization of schemas so that the child may apply these to development of more operational systems during the second substage.

The Intuitive period (4-7) is a time for approximating adult thinking. Due to his egocentrism, the child has a great confidence in the veridicality of his operations. However, these operations are primarily intuitive, arising out of his ideosyncratic manipulation of his view of the world. Operations clearly exist, but their application is inconsistent and their content is not yet social. A logical imperative forces the child from intuitions to mature operations. We do not allow thought to be private, since communication requires the following of certain conventions of thought. The boy did not fall off his bicycle because he broke his arm. The relationship is the other way around. Since we will accept illogical communication or judgement, the child has no choice but to develop a complex set of logical operations which serve to organize his egocentric, intuitive preoperations into more mature operations.

Concrete Operational Period

The concrete operational child has generalizable operations, has a more consistent logic system, can temper perceptual judgement with conceptual judgement, and is less realistic and less egocentric. While the preoperational child orders various sized sticks by physically comparing each pair of sticks, the concrete operational child surveys the entire array and then arranges them without trial and error. Logical actions are now successfully internalized mental actions.

Though the immediacy of perception no longer dominates judgement, an inability to go beyond what has already been experienced limits the range of judgement. This limitation is typified in the difficulty of generating an exhaustive list. If the alternatives are all present, or have been innumerated, then selection of the best alternative on the basis of some consistent criterion is possible. However, if the alternatives are yet to be specified, the generation of choices is often haphazard and sometimes even obvious alternatives are overlooked.

Formal Operations Periods (7 years or more)

The ultimate liberation from reality begins during adolescence. Thought becomes formal to the extent that a generalized operation (form) can extend what is known to what could be. Just as one can extend an existing cement wall by building a form based upon it (and by filling the form with more cement),

one can extend concrete operations by specifying a form to go beyond. One is no longer limited to what is. The concept of a perfect parent, or a perfect educational system, or a perfect world is made possible by extending the existing form of each beyond the faults of each. (Sadly, it is a while before the adolescent separates the formal possible from the likely attainable).

OVERVIEW: PRINCIPLES FOR CONSIDERATION, DIRECTION FOR MORE THOUGHT, AND A COUPLE GUARDED WARNINGS.

After what has been, by necessity, a very cursory outline of Piaget's stages of development, an abstraction of some of the principles particularly relevant to the theme of this conference is appropriate.

The Gene and the World: An Interaction

Intelligent adaptation arises out of neither a genetic code nor an imposing environment. Rather, it appears to result from a very particular kind of active interaction between the organism and the world. If our goal is to provide learning experiences, we must be aware of the manner in which adaptation occurs, the role of feedback, and the requirements for active participation. I should hasten to point out that some intervention programs conceivably can be founded in procedures that do not reflect this natural developmental pattern. In fact, there are probably instances when such a departure is highly desirable. However, recognition of a departure as such, and consideration of what spurious effects that departure may have upon the child, would seem to be a judicious precaution.

Motivation: Making the Whole Thing Go

Equilibration is the central motivational construct in Piaget's theory. Adaptation (Assimilation and Accommodation) occurs in order to resolve an incongruity (imbalance). Here we have the active meeting of mind and world, in that incongruity exists only *within* the individual. What is challenging for some, is boredom for others. Motivation for Piaget is not a characteristic of the environment, it is totally dependent upon what the thinker does with the environment. It has been amply demonstrated (Turiel, 1969) that successful development calls for environmental problems to be just slightly ahead of the learner. If a problem is too far beyond the learner's level of development, no incongruity arises and no growth results.

In short, education should be a process of intellectual seduction. We should take small enough steps so that the learner feels each movement toward the goal is logical, reasonable, and natural. Alas, I feel all too often we are guilty of intellectual rape, because we know what the goal is and lack the patience to lead the student by small steps toward that goal.

If we draw upon the equilibration process as a motivation tool, we will rely more heavily upon intrinsic rewards than upon extrinsic rewards. This, of course, is a major educational tenet of Bruner (1961) and other students of information processing.

Ordinality: An Index of Maturity, But . . .

One must be very careful not to assume that once an individual passes through one stage of development that he never engages in less mature behavior again. Maturity is relative, and everyone demonstrates pockets of immaturity. When we approach a drastically new situation, we are likely to attempt to obtain a concrete grasp of the variables before we fully understand their formal abstractions. We even have some residual immaturity. Once we passed 6-8 years of age, we realized that the sun did not follow us and that we could not control inanimate objects without physically touching them. Yet, watch the body English employed by most bowlers after the ball has been released and the whole issue of causation is open to question.

Also, since ordinality is built upon a system of prerequisites, some skills can be relatively isolated from other aspects of development. A child could progress through all stages in the cognitive domain with a minimum awareness of sophisticated aspects of body, space, and physical movement. It is dangerous to equate age, or even intelligence, with physical skill, for we may expect far too much (or too little) of otherwise talented children. Each child must be accepted and handled according to where he *is* in development of the *particular* skill in question.

Consolidation and Play: Putting it all Together

There is a practical limit to how quickly one can move from one stage of development to the next. This is due, in part, to the fact that it takes time for skills to become "fixed" or consolidated. Bruner (1973) uses the term "modularization" to describe this process. The original form of a skill has a lot of wasted and unnecessary components. The modularized form of the same skill is streamlined and efficient. The mobility (ability to be incorporated into other skills) of an unmodularized action is very limited. Likewise, the ability to perform the unmodularized act under pressure is low. A highly modularized skill which is familiar to most adults is driving an automobile. If you remember your beginning day as a driver, you will recall the concentration it required and how quickly new found skills unravelled during a crisis.

Modularization develops best under conditions that are much like play. It thrives on a relaxed atmosphere where the means to a goal can become more important than the goal itself. Piaget calls this "practice play" and it is an essential characteristic of early development.

As social play begins to dominate the late preoperational child's play time, there is a shift in emphasis away from pure practice play. However, the function of practice play in modularization is too important for it to disappear entirely. Social play may well serve many useful social functions, but some forms of skill development may be more suitable to less demanding solitary play (at least until some of the basics are mastered).

Piaget's Clinical Method: Maybe the How will Help

Piaget's Clinical Method is an interaction technique that has as its goal the discovery of the child's level of knowledge about a specific task or concept. It is not open ended, in the sense that a particular concrete stimulus or situation

serves to define the scope of inquiry. It is open ended, in the sense that the questions asked and the *direction* of inquiry are determined by the observer's assessment of what the child is trying to demonstrate. Three features of the technique seem particularly worth mentioning here: 1. the goal is to discover the individual child, 2. once the observer decides where the child is, he then formulates a question or experiment that will validate his decision, and 3. errors are viewed as information that is equally welcome as correct responses.

Primacy of the Concrete: Do you mean Physical?

It has been noted several times throughout this paper that there is a consistent development from the concrete-specific toward a more abstract-subjective experience. A basic characteristic of the hierarchy is a need for concrete interaction before one can move on to the abstract. A natural temptation leads to the conclusion that remediation should begin with the concrete, and the concrete could very well mean beginning with physical interaction.

However, if you look at the purpose in moving to the concrete, you find that the aspiration is only to find a base where assimilation is possible. The retreat is to the known, and "concrete" takes on the meaning of "already experienced and adapted to". It follows that we should be very careful NOT TO EQUATE the concrete with the physical. Again, each task needs specific analysis with each child. For some, the interchangeability of concrete and physical may be valid. For others, an internal representation or operation may provide the necessary basis for assimilation.

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PIAGET'S THEORY OF MEMORY DEVELOPMENT: IMPLICATIONS FOR MOTOR SKILL LEARNING

Leonard D. Zaichkowsky

INTRODUCTION

Although the problem of memory has been with man from the beginning it has only been during the past few years that child psychologists have concerned themselves with the problem of memory development in children. Amongst the researchers who have shown a sudden interest in memory development is Jean Piaget. This is evidenced by his most recent book *Memory and Intelligence* published in 1973, which is concerned with memory development in children and the relationship between memory and intelligence. This present paper will provide a summary of Piaget's research which has let to his theoretical formulations on memory.

The study of memory, as Piaget sees it, is most important to general education in that it seems to hold a place in much of the curriculum presented to young children. How important is the memory in the education of a child? Do schools provide children with information that requires memorization? or understanding? Piaget maintains that if education is to be passive, then memory becomes most important in the learning process. If education is active, then memory is subordinate to understanding and discovery. Piaget believes that traditional education has emphasized memory, and of course frowns upon this approach. He believes that we must discover the structure of spontaneous memory. Is it closely related to intelligence or is it independent?

Psychologists in general have taken two extreme positions on memory. Some, such as Freud, believed that memory was simply a recording of facts which were filed in the subconscious. Another theory considered memory to be a kind of reconstruction which is dependent upon the intervention of intelligence. Piaget favors the latter theoretical position.

In dealing with memory, Piaget uses the customary terms of "coding" and "decoding" with the intervention of a "code". The question posed by Piaget is whether the memory code stays the same (invariant) throughout developement or becomes modified (variant), depending upon the individuals operational level. Piaget hypothesized the latter, i.e. memory changes during development do not simply reflect a child's encoding and decoding power: the code itself is susceptible to change.

Piaget jusitifies this hypothesis through a series of systematic experiments conducted with Inhelder, and other collaborators. Memory was studied by presenting slides to children varying in age from four to nine years. Three different retention intervals were used, they being, one hour (immediate memory) one week later, and six months later. It should be noted that Piaget's definition of immediate memory is different from that used by North American memory researchers. Howe (1970) for example describes immediate memory as that lasting up to one minute.

Getting back to Piaget's hypothesis, Piaget reasons that if the memory code remained the same then memory should stay unchanged, or perhaps deteriorate slightly. On the other hand, if the memory code changes as a function of the

operational level of the individual, then one would predict an improvement in memory. Three experiments which lend support to Piaget's hypothesis will now be presented as will one experiment which demonstrates a decrement in memory performance with time.

PIAGET'S EXPERIMENTS DEALING WITH MEMORY

Children were presented with a slide of 10 sticks varying in size from 9 to 15 cm. (see Figure Ie) and ordered from smallest to largest. The child was told to look at the sticks since he would be asked to draw them the next day. After retention intervals of one day, one week and six months the child was asked to draw what he had seen. The results showed the childs response to be a function of his development. Piaget identified a first level which he called level A (3-4 years). The child remembered the sticks in the series but forgot they were unequal and hence the drawings were all about the same size (see Figure Ia). At Piaget's second or B level (4-5 years), the child knew there were small sticks and large sticks but failed to recognize a serial configuration (see Figure Ib.) At level C the child drew three sizes of sticks, small, medium, and large (see Figure 1c). Children began making a series of four elements at about 5 or 6 years which Piaget labeled level D (see Figure 1d), however they did not remember the complete configuration. Finally at age 6-7 years the original configuration was recalled (see Figure 1e).

Figure 1a Figure 1b Figure 1c Figure 1d Figure 1e

The results are interesting in that the child did not remember what was shown him, but rather how he interpreted the model. When tested six months later it was striking that 74% of the children experienced better memory than their immediate memory. The remainder of the subject's experienced the same memory. No subjects demonstrated a decrement in memory. The improvement in memory was not displayed by large leaps between different levels, rather there was gradual improvement from one level to the next. Piaget's "improvement" findings approximate the phenomena of "reminiscence", popularized by Ballard (1913), which occurs in motor learning and verbal learning. The theoretical explanations however differ. The incomplete theories of reminiscence include memory consolidation through recall, mental rehearsal, motivation, and preserverence of neural activity. Piaget agrees that Ballard's "reminiscense" resembles his experimental improvements in memory, however he concludes that reminiscence is strictly quantitative in nature, whereas his seriation experiments demonstrate a progress in the schema itself.

Piaget explains his results by stating that the memory image is not a representation of the original model, but rather acts in a symbolic manner so as to reflect the subjects assimilation "schemes"[1] which pertains to the way the model was understood and not copied. The operational scheme of assimilation

evolves as the child experiences different movements, objects, etc. in his everyday life. The memory after six months is then a decoding of a code which has changed through experience, and is not what it was at the time of encoding. According to Piaget, this experiment clearly demonstrated that memory is a function of intelligent reconstruction and not simply a passive recording.

Piaget replicated his first experiment with a more difficult model. The series was M-shaped (consisting of 11 elements) with big sticks at each end and smaller ones in the middle (see Figure 2). Memory was tested after one week and after 10 weeks. Although the results were less convincing, 38% of the subjects progressed from one level to the next. Again progress was gradual rather than sudden.

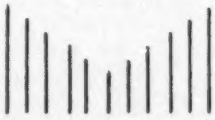

Figure 2

Piaget reports another memory experiment which dealt with the retention of horizontal levels. Early Piaget experiments have demonstrated that children need to be 9 or 10 years old before they can predict the horizontal level of water in a half full jar of water regardless of the angle. The reported experiment had children recall a half full bottle of water at 45° using retention intervals of one hour, one week, and six months. In the first two retention intervals memory appeared to represent the way the subjects assimilated the model. After six months there was improvement in about 30% of the class. The highest increases were among the children aged 7 to 9 years which is noteworthy since they are approaching the operational level necessary for this task.

The above three experiments thus demonstrate improvement in a child's memory over time, improvement which Piaget believes is due to change in the memory code brought about by the child interacting with the environment.

In another ingenious experiment Piaget demonstrated that changes in the memory code due to operational progress does not necessarily lead to better recall six months later. A decrement in memory performance occurs when a subject is presented with a model which produces a conflict between two or more different operational "schemes".

This was aptly exemplified in an experiment which had eight matches presented to children as shown in Figure 3a.

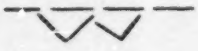

Figure 3a

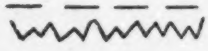

Figure 3b

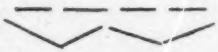

Figure 3c

Figure 3a results in a conflict for young children since there is numerical equivalence, however the lengths are different. Young children believe that if the two lines of matches are the same length, they should have the same terminal points.

Reproductions appear as Figure 3b for young children. In this case they added more matches to conserve length. Older children conserved the same number by making each match longer as in Figure 3c. Only advanced subjects remembered the original configuration. It is the conflict then, between number and length, which results in memory decrement.

THE THREE MEMORY TYPES

Piaget uses his research to demonstrate the developmental difference between three types of memory, which he calls recognition, reconstruction and evocation. These three memory types represent the same distinctions made by Adams (1967) with the exception that Adams refers to evocation as recall. Recognition can rely on perception and sensorimotor "schemes" above, while evocation requires mental imagery or language. As a result Piaget maintains that children do not have evocative memory until 1½ or 2 years, whereas recognition memory is present as early as the first few months of life. Recognition memory can be observed in lower animals, but evocation is specific to the higher primates or man.

Piaget then alludes to reconstruction memory which is intermediate between recognition and evocation. In this case the subject matter must arrange the elements of the original configuration which resembles imitation. In all experimental situations memory by reconstruction was better than evocation.

PIAGET'S CONCLUSIONS ON THE RELATIONSHIP BETWEEN MEMORY AND INTELLIGENCE

Piaget concludes that memory consists of two components.

1. Figurative component - which is perceptual in the case of recognition, imitative in the case of reconstruction, and mental imagery in the case of evocation.

2. Operational component - which consists of the intellectual schemata on which memory is built.

A schema is the generalization of a frequently presented action. When an action produces a certain result it can be generalized to other situations. This Piaget also refers to as "memory in a broad sense" as opposed to the figurative component which he terms "memory in a strict sense". The results of Piaget's experiments have led him to believe that every memory is a figurative symbol which interacts with the schemata or intelligence which is present at that particular developmental stage of the child.

IMPLICATIONS OF PIAGETIAN MEMORY THEORY FOR MOTOR SKILL LEARNING

The writer proposes to present two research illustrations which lend support to Piaget's memory theory. The first example is in response to Piaget's pedagogical questions raised in the introduction of this paper, namely should education concern itself with teaching children how to memorize or should education concern itself with developing creative minds? Piaget himself confesses that he is not an educator however feels his findings have application to teaching

methodology. He feels children should be able to do their own experimenting. The role of the teacher is simply to guide so that the child understands. Discovery, Piaget feels, allows the child to retain the information for the rest of his life. In a recent study at Boston University, Mancini (1974) demonstrated that the discovery method applied to motor skill learning was superior to a teacher directed approach both in terms of attitude and social interaction of children. Although the study did not look at memory, it does lend support to Piaget's views on "discovery learning".

A study conducted by Zaichkowsky (1974) on memory development demonstrated support and application of Piaget's theory of memory development. Piaget concludes that memory interacts with the developmental stage of intelligence in the performance of any verbal or motor task. Older children, through experience in the environment, have a larger storehouse of information to draw from in performing a task. The Zaichkowsky study showed that five year old children experienced trouble in performing a serial motor task which taxed the memory abilities of the child. When the serial task was kept simple the five year children performed nearly as well as nine year old children. This suggests that teachers should resort to keeping sequential motor tasks simple, since in Piagetian terms the schemata has not been fully developed.

Undoubtedly there are many other practical applications of Piagetian memory theory to the motor domain which could be mentioned. However, suffice it to say that Piagetian theory in general has had a tremendous impact on education, and is now a fundamental part of contemporary child psychology.

FOOTNOTES

[1] Piaget distinguishes between "schema" and "scheme" in that the former refers to an iconic representation, whereas the latter implies no figural connotation.

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PIAGETIAN THEORY AND ITS IMPLICATION TO TEACHING STYLES, TECHNIQUES AND STRATEGIES

Rudy Mueller

INTRODUCTION

An examination of Piaget's works led me to translate his contributions into behavioral proposals for teachers. In a previous paper (Mueller 1974, b), the teaching behaviors were identified and evidence offered to support the proposal. Subsequently, a second paper (Mueller 1974, a), interpreted these proposals into fifteen specific teaching behaviors organized into a checklist. The use of this checklist makes it possible for one to determine the behavioral congruency of a teacher's planning or execution with Piagetian ideas. A teacher's plan of action could have a range of 0% to 100% in the "Planned Behavioral Congruency Profile". A teacher could also determine how congruent the actual implementation was with the fifteen Piagetian behaviors - this is the "Realized Behavioral Congruency Profile" and its range is also from 0% to 100%. Both of these profiles help a teacher to plan, execute, evaluate, and change their involvement in the teaching/learning transaction.

It is also important to examine the various teaching styles (methods), techniques and strategies which have been offered and will be proposed to teachers as a way of conducting an educational process. If it can be determined how congruent the intrinsic arrangement is to Piagetian thought, then teachers can make decisions about its use, modification, or elimination. In order to make this decision the teacher would need answers concerning the "Structural Congruency" of the style, technique or strategy. The following are some illustrations of that analytical operation based on the Teaching Behavior Checklist presented in Figure 1.

FIGURE 1
A BEHAVIORAL CHECKLIST TO DETERMINE
A PIAGETIAN TEACHERS CONGRUENCY PROFILE

	YES	NO
1. Organizes learning environments which contain numerous materials, activities which are appropriate for interests, various ability levels, and accommodates other individual differences. Comments:		
2. Maintains learning environments so that the numerous materials and activities are highly visable and readily available. Comments:		

	YES	NO
3. Formulates a vague plan of action which indicates what the expectations are. One which is flexible and responsive to the learners. Comments:		
4. Groups children heterogeneously. Comments:		
5. Allows children to decide about their involvement with the learning environment. Comments:		
6. Allows and values free interaction by students in a cooperative rather than competitive climate (where they help each other learn). Comments:		
7. Relinquishes authoritarian control to students, promoting self direction and group processes. Comments:		
8. Induces and values student thinking - including original thoughts. Comments:		
9. Selects learning arrangements where learners can manipulate, discover, inquire, verify, invent, create, and refine. Comments:		
10. Uses "active methods" to increase the frequency rate of experience (practice) so that the specific instance becomes stamped in (engendered, internalized). Comments:		

	YES	NO
11. Accepts errors or inappropriate responses by learners while learning - sees them as indicators of development or a transitional situation which will change with more data. Comments:		
12. Values self-evaluation by the learner. Comments:		
13. Asks questions which help learners focus on the evaluation process - to cause the process of refinement or verifying or Designs situations which help learners to gain additional insights so they can be used to reevaluate or refine the instance or response. Comments:		
14. Behaves in a supportive/facilitating manner, never deliberately uses "put down" situations where the child's self worth is reduced or placed in high jeopardy. Comments:		
15. Did not use tests, exams or situations which value blind conformity or memorization of existing knowledge. Comments:		

THE SPECTRUM OF TEACHING STYLES

The Spectrum of Teaching Styles (Mosston, 1972) is a construct of alternative teaching arrangements based on the relationship of decision making between the learner(s) and the teacher. Muska Mosston (1972) offers seven distinctively different teaching styles, each with its intrinsic strengths and liabilities. This realization prompted the author to indicate that each teacher should develop competency in each style in order to demonstrate "mobility ability" along the spectrum of teaching styles. Let's deterimine if that still would apply for a Piagetian Teacher.

Command Style

The first style to analyze using "The Behavioral Checklist of a Piagetian Teacher" is the command style of teaching. In this style, the teacher makes all the decisions all the time and the learner is expected to follow or adhere to the decisions of the teacher. In the classroom, the learner would be a passive receiver of information, In activity classes, he/she would perform robot/military movements, doing the same thing in the same way at the same time. The learner would have a high degree of dependency on the teacher and the learner's behaviors that would be valued would be those that conformed to the expectations of the teacher.

An analysis of the checklist, yields this information.

(1 - No, 2 - No, 3 - No, 4 - Instance specific, 5 - No, 6 - No, 7 - No, 8 - Instance specific but not totally, 9 - Instance specific but not all, 10 - Instance specific, 11 - Instance specific, 12 - No, 13 - No, 14 - Instance specific, but more likely No in part, 15 - No).

Therefore, the "Structural Congruency for Command is No - 9, and Instance Specific - 6, (that's where the teacher would have to do it before its congruency could be determined). Note that in the command style there is no unqualified Yes. So the command style is 0% structurally congruent, 40% "Implementation Dependent" and 60% structurally incongruent. It seems to present one with an abundance of evidence that the Command Style would not be used by a Piagetian teacher.

Task Style

This style provides for some decisions to be made by the learner which are related to the physical difference of learners. The decisions the learner makes are: when to start, when to stop, where to work (geography not subject matter) and the pace of doing the task. Let's compare this style to the checklist to ascertain its congruency profile:

(1 - Instance specific (partially Yes), 2 - Instance specific, 3 - Instance specific (partially Yes), 4 - Instance specific, 5 - No, 6 - No, 7 - Partially Yes, 8 - Instance specific, 9 - Partially Yes, 10 - Partially Yes, 11 - Instance specific, 12 - No, 13 - No, 14 - Instance specific, 15 - Instance specific.

The style congruency profile is Yes - 0, Partially Yes - 5, Instance specific - 8, No - 4. The style has 0% Structural Congruency, 55 1/3% Implementation Dependent and only 26 2/3% Incongruent Structurally which indicates that this style is closer to what might be used by a Piagetian teacher.

If the teacher were to make the following modifications to the task style of teaching, it would have a different profile:

1. Use the multiple tasks - multiple stations format in different content areas based on student needs, interests, differences and reactions.
2. Allow children to choose the Task based on their perceptions of their needs, interests, etc.
3. Put no restrictions on interaction with classmates, other than those that are concerned with the specific task.
4. During the evaluation/feedback students could ask questions to encourage

self-evaluation or which would stimulate verifying or refining operations.

5. Eliminate use of all techniques which put high value on conformity, memorization and dependency on others.

The modified Task profile would then read like this:

(1 - Yes, 2 - Yes, 3 - Yes, 4 - Instance specific, 5 - Yes, 6 - Partially Yes, 7 - Partially Yes, 8 - Instance specific, 9 - Partially Yes, 10 - Yes, 11 - Yes, 12 - Yes, 13 - Yes, 14 - Instance specific, 15 - Instance specific.

The profile of this modified task style would be Yes 8, partially yes 3, Instance specific - 4, and No's 0 (Structural Congruency of 55 1/3% and 0% Structural Incongruency) which means modified task is even closer to Piagetian thought than is the Task style offered by Mosston.

Reciprocal Style

This style is an arrangement which stresses the social interaction of students where they help each other learn in a cooperative manner. This interaction is the essence of the style. The congruency profile would read like this:

(1 - Instance specific, 2 - Instance specific, 3 - Partially Yes, 4 - Yes, 5 - No, 6 - Yes, 7 - Partially Yes, 8 - Partially Yes, 9 - Partially Yes, 10 - Partially Yes, 11 - Instance specific, 12 - No, 13 - Partially Yes, 14 - Instance specific, 15 - Instance specific).

So, this total profile reads Yes - 2, Partially Yes - 6, Instance specific - 5, and only 2 No's. Again one can detect slight movement toward more structural congruency or potential congruency with some modifications.

Individual Program - Teacher Design

This style offers the learner learning tasks. These tasks are presented in different levels of complexity. The "degree of difficulty" of the task is determined by the manipulation of some internally related factors. For example, if the task was "addition" - one level would be adding two single digit numbers, next would be 3 single digit numbers and so on until it would be two digit numbers. . .fractions, mixed numbers, etc. This level determination can be distinguished in almost all subject matter areas.

The style itself encourages a pre-contact evaluation, the learner might ask, "Where am I when it comes to addition?" Once the learner makes the selection he operates independent of the teacher - even to the point of self-evaluation. So the congruency profile of Individual Program - Teacher Design (I.P.T.O.) would read like:

(1 - Yes, 2 - Yes, 3 - Yes, 4 - Partially Yes, 5 Yes, 6 - Partially Yes, 7 - Partially Yes, 8 - Partially Yes, 9 Partially Yes, 10 Yes, 11 - instance specific, 12 - Yes, 13 Yes, 14 - Instance specific, 15 - Instance specific).

The total profile is Yes 7, Partially Yes - 5 Instance Specific - 3, No - 0. Therefore I.P T.D. has a Structural Congruency of 46 2/3%, an Implementation Dependency of 20% and a modification Potential of 33 1/3%. For the first time, a style has a 66 2/3% - 100% potential to be fully congruent with Piagetian education.

Guided Discovery

This style offers the student a series of clues, questions, and stimuli which create a small cognitive dissonance which motivates the learner to inquire and results in a discovery. Each learner response leads to the next clue, question, stimulus and this process continues until the learner discovers the pre-determined goal of the teacher (convergent thinking). Many see this style as resembling the Socratic method and in some respects it is very similar.

The congruency profile reads like this:

(1 - Partially Yes, 2 - Partially Yes, 3 - Partially Yes, 4 - Instance specific, 5 - Partially Yes, 6 - Partially Yes, 7 - Partially Yes, 8 - No, 9 - Partially Yes, 10 - Partially Yes, 11 - No, 12 - Yes, 13 - No, 14 - Inspecific, 15 - Instance specific)

The total profile reads: Yes - 1, Partially Yes - 8, Instance specific - 3, No - 3, Structural Congruency - 6 2/3% and Structural Incongruency - 20%.

For the first time in the spectrum, we seemed to move further from the Piagetian thought. The fact is that the profile reflects a prescribed involvement by the teacher, one where the teacher emits the stimulus, waits for someone in the class to respond and verifies the answer. It doesn't have to be conducted in that manner because one could use a different media and different forms of communication. With the changes in the communication and the use of some retrievable system to verify responses and the option of the learner to work alone or with someone there would be a significant change in the Congruency Profile. In fact, the Modified Guided Discovery Style would have Yes - 8, Partially Yes - 1, Instance specific - 3, No - 3, Structural Congruency - 55 1/3% and a 20% Structural Incongruency moving Guided Discovery closer to Piagetian thought.

Problem Solving

This style presents the learner with a problem which causes learner dissonance. This motivates the child to explore, inquire, investigate, until he/she produces a response or many responses (divergent thinking). The responses can be verified by ascertaining if they solve the problem, within the prescribed parameters of the problematic situation. If it does, it is a valid answer and all answers which solve the problem are valued regardless of their simplicity or complexity.

The Congruency Profile looks like this:

(1 - Yes, 2 - Yes, 3 - Yes, 4 - Instance specific, 5 - Yes, 6 - Partially Yes, 7 - Partically Yes, 8 - Yes, 9 - Yes, 10 - Yes, 11 - Partially Yes, 12 - Yes, 13 - Yes, 14 - Instance specific, 15 - Instance specific)

The total profile: Yes - 9, Partially Yes - 3, Instance specific - 3, and No - 0, Structural Congruency 60%, Implementation Dependency 20% and 0% Structural Incongruency. Problem solving has a potential of 80% - 100% congruency in practice.

Individual Program - Learner Design

This style provides the learner with the opportunity to design his/her entire learning involvement based on a teacher determined focus. The focus may be

very general like Math, Language, War/Peace, Games or more specific such as addition, 20th Century Wars in the United States, nouns which change their spelling when they become plural The learner would identify his/her goals and design a plan of action to accomplish the goals. The student would make decisions about what criteria one used to determine if their goals are attained. They would also decide who shall sit in judgment of the quality of their program. Let's see where this style fits in regard to Piagetian thought:

(1 - Yes, 2 - Yes, 3 - Yes, 4 - Instance specific, 5 - Yes, 6 - Yes, 7 - Yes, 8 - Yes, 9 - Yes, 10 - Instance specific, 11 - Yes, 12 - Yes, 13 - Yes, 14 - Instance specific, 15 - Yes)

Total: Yes - 12, Partially Yes - 0, Instance specific 3, No - 0, Structural Congruency - 80%, Implementation Dependency 20% and no Structural Incongruency. Therefore, this style seems to be the most congruent with Piagetian thought about the educating process.

Before analyzing other techniques, a word of explanation about the analysis may be necessary at this point. In analyzing a specific technique in order to determine the precentage of Structural Congruency, one takes the number of Yes's and divides by the number 15 (15 items), i.e. 12 Yes's = 12 divided by 15 or, 80%. Or, one can obtain the percentage of Structural Incongruency by dividing the number of No's by 15 (14 no's divided by 15 = 93 1/3% Structural Incongruency). One could also find the percentage of instance specific (Implementation Dependency) which is the result of the teachers idiosyncratic make up or something unique in the organization, the institutional goals or the structure of the subject matter. The factor is not determined or controlled by the intrinsic structure of the styles, technique or strategy. Therefore, if we had a situation where 5 items are instance specific (5 divided by 15 = 33 1/3%), it would be 33 1/3% Implementation Dependency. In other words, its open and the actual implementation can make it 33 1/3% more congruent or up to 33 1/3% less congruent. The Implementation Dependency factor plus the Structural Congruency factor would give a percentage range of its potential congruency.

OTHER EDUCATIONAL TECHNIQUES ANALYZED

There are other educational techniques and methods advocated for use by teachers and they too can be analyzed for their structural congruency.

Contracting

A strategy used by some teachers to ensure a clear understanding of expectation and resonsibility is a technique known as contracting. It is a learning agreement between the teacher and the learner. Since contracting can have many different arrangements the structural read would be: Yes - 0, Partially Yes - 0, Instance specific - 15, No - 0. This interprets into the realization that contracting could be 100% congruent of 100% incongruent. Contracting is not necessarily structually Piagetian, but how it is implemented is what makes the difference.

Laboratory Method

A T-group is comprised of people who spend time together in an instructional setting face to face and where individuals participate as learners; members help

each other in their quest for understanding. The data for learning comes from the immediate experience(s) of the group. The process centers on the experienced behaviors, feelings, perceptions, and reactions of the group members while they are together. There is a group leader who takes an "actively passive" role facilitating the groups development and process. The participants are given a vague task of constructing a group which will serve the growth of all the members.

Essentially, a kind of social vacuum is produced. Leadership, agenda, expectations, usually prescribed by some authority are blurred or missing.

As the group members endeavor to fill the void, their behavioral output mounts and supplies the group with information. Participants function as observer-participant, as diagnostician-actor, as planner-educator-evaluator, and theorist-practicioner, as expressor of feeling and critic of expression, and as helper-client (Joyce, 1972).

The "Laboratory Method" congruency profile read:

(1 - Yes, 2 - Yes, 3 - Yes, 4 - Yes, 5 - Yes, 6 - Yes, 7 - Yes, 8 - Yes, 9 - Yes, 10 - Instance specific, 11 - Instance specific, 12 - Yes, 13 - Instance specific, 14 - Instance specific, 15 - No.)

Total: Yes - 10, Partially Yes - 0, Instance specific - 4, No - 1 or 66 2/3% Structural Congruent and only 6 2/3% Structural Incongruent and 26 2/3% Implementation Dependent. Therefore this technique has a range of 60 2/3% - 93 1/3% potential Congruency.

Taba's Inductive Teaching Model

Taba (in Joyce, 1972) identified a set of cognitive tasks or thinking tasks and then developed sets of teaching moves called teaching strategies which would induce these tasks. Taba has identified three major teaching strategies: 1) Concept formation 2) Interpretation of data 3) Application of principle and three phases in each teaching strategy.

TABA'S INDUCTIVE TEACHING MODEL

STRATEGY ONE - CONCEPT FORMATION

Phase One	Phase Two	Phase Three
Enumeration and Listing	*Grouping*	*Labeling Categories*

STRATEGY TWO - INTERPRETATION OF DATA

Phase Four	Phase Five	Phase Six
Identifying dimensions and relationships	*Explaining dimensions and relationships*	*Inferences*

STRATEGY THREE - APPLICATION OF PRINCIPLES

Phase Seven	Phase Eight	Phase Nine
Hypothesizing predicting consequences	*Explaining and/or supporting the predictions and hypothesis*	*Verifying the predicting*

"In the case of all three strategies, the atmosphere of the classroom is cooperative, with a good deal of pupil activity, but the teacher is generally to be the initiator of phases, and thus is the major controller of information. The sequence of the activities is determined in advance, so the teacher is in a controlling, if cooperative position" (Joyce, 1972).

With this explanation of Taba's Inductive Teaching Model, let's examine its Structural Congruency.

(1 - Instance specific, 2 - Instance specific, 3 - Partially Yes, 4 - Instance specific, 5 - Partially Yes, 6 - Yes, 7 - Partially Yes, 8 - Yes, 9 - Yes, 10 - Instance specific, 11 - Instance specific, 12 - Instance specific, 13 - Instance specific, 14 - Instance specific, 15 - Instance specific)

Total: Yes - 3, Partially Yes - 3, Instance specific - 9, No - 0.

This profile with a 27% Congruency, a 0% Incongruency and a 60% Instance Specific means the model has a high "Implementation Dependency". Potentially, with the Structural Congruency, the appropriate implementation behaviors and some structural/organizational modifications, this model has a potential congruency possibility of 80% - 100% but it's primarily dependent on the teacher.

Dramatic Play Experience

In dramatic play, role playing is used as a vehicle to portray a situation for study and analysis. Little emphasis is placed on the roles played, but on reactions to the situation thus created. Role refusal is not appropriate. The emphasis in dramatic play is how one would act in an actual situation. The pupil never plays his real life role. Through the spontaneous situation which is created, the group is able to analyze and critically evaluate reactions.

This teaching strategy is basically a group-oriented approach concerned with feelings and reactions as individuals interact with one another. Two conditions are necessary for implementation (1) the situation dramatized must be representative of the problem felt by the members of the class and (2) most of the group must want to feel the need for explaining the situation. In that way the process would resemble a problem solving approach to a group concern.

In examining the Structural Congruency Profile:

(1 - No, 2 - No, 3 - Yes, 4 - Instance specific, 5 - Yes, 6 - Yes, 7 - Partially Yes, 8 - Yes, 9 - Yes, 10 - Instance specific, 11 - Instance specific, 12 - Yes, 13 - Yes, 14 - Instance specific, 15 - Partially Yes)

with a 42 2/3% Structural Congruency and a 13 1/3% Incongruency Leaving a

44% Implementation Dependency. When using this technique, one must be very conscious of their behavior or it will fall below the 50% congruency range.

SUMMARY

Anyone who wishes to ascertain the appropriateness of using any teaching style or strategy can compare and contrast it to the 15 items in the Piagetian Behavioral Checklist and determine its potential Piagetian "Structural Congruency", if it were utilized.

The same 15 items can be used when observing an actual teaching/learning transaction to determine actual "Implementation Congruency".

Lastly, if someone does a "Structural Congruency" analysis and then an "Implementation Congruency" analysis on a given session, the teacher would gain some insights into how their behaviors have realized the session's structural potential or how their behaviors have, in fact, reduced the structural potential in that specific session.

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PIAGET AND PLAY

Sandra J. Suttie

Piaget has dedicated many of his creative energies to uncovering the nature of intelligence. However, his efforts have not been limited to the cognitive domain as he postulated that all phases including affective and psychomotor of children's behavior depend on their cognitive structures. Piaget's unique approach is to study the organizational activities within an individual rather than from the approach of focusing on the stimuli from the external environment. The structure of thinking Piaget believes is inherent. Piaget believes children go through universal identifiable developmental phases. Intellectual behavior evolves from activity and doing, without thought, to doing knowingly, to conceptualization. Play is an exercise of actions. It leads from activity to representation, to the meanings the child attaches to symbols. Children play in certain ways or patterns because that kind of pattern or behavior is determined by the structure of the cognitive processes of the child. Structures, such as the cognitive structure, change systematically within the child while the functions remain invariant.

One basic function of man is adaptation, the cognitive striving of an individual to find an equilibrium between himself and his environment. As the human organism encounters new situations or problems in this environment, a

state of disequilibration exists. Man, the child or adult, seeks to resolve this disequilibration. This incongruity thus serves as an intrinsic motivator to him, and man will place himself into situations or will create problems in which a minor state of disequilibration with the environment exists. Man needs these situations and problems. They will catch his attention, interest him, motivate and stimulate him to action and to interaction with the environment. Problems, or incongruities to be solved, serve to elevate the level of arousal of the organism. Ellis, in his book, *Why People Play* (1973), describes play as that behavior which seeks to elevate the arousal level of the organism. Of the many play theories expounded throughout the ages, the concept of play as arousal seeking behavior is among the newest. Its validity is established through various disciplines, including physiological psychology.

Arousal seeking behavior, with its subsequent action toward equilibration, is an aspect of adaptation. Piaget's concept on adaptation, as a biologist and a behaviorist, are compatible and supporting of this view of play.

Adaptation, or equilibrium, has two functional components: assimilation and accommodation. The assimilation process involves changing elements in the environment in such a way that they can be incorporated into the structure of the organism. The individual recognizes, categorizes, and utilizes events in terms of his previous habits, conventions and preferences. He experiences an event as he conceives it. Reality is interpreted in terms of past experiences; the input is bent to fit the child's existing intellectual organization.

Accommodation, the other component of adaptation, is the adjustment or modification by the organism to the environment. The individual notes the unique aspects of new encounters and takes account of these in an effort to change, modify or adjust himself to fit the new reality. Thoughts and behaviors are modified internally.

Although assimilation and accommodation are opposite processes, they always act together to produce adaptation to the environment. One process can predominate over the other, but neither exists in isolation. The balance between assimilation and accommodation is seen as the basis for intelligence. In the adult, intellectual functioning, consisting of these two processes, is in a state of equilibrium in which they are relatively distinct and separate, yet coordinated and complimentary. To reach this state, the child must undergo various stages or development during which the assimiliation-accommodation relationship undergoes various transformations. As new elements are incorporated into earlier schemata (assimilation), the organism modifies earlier schemata to adjust to the new elements. Cognitive change is thusly insured by this shifting relationship.

Play, according to Piaget, is that behavior which occurs during a primacy of assimilation over accommodation. His major treatise on this topic is his book, *Play, Dreams and Imitation in Childhood* (1951), which has been translated into English. In play, the human bends reality to fit what he "knows" (assimilation). A child playing sheriff, alters or assimilates reality to fit his concepts. He does not accommodate or adjust his concept of sheriff during his play. Reality is altered by pretending there is a [illegible] or a jail in the play area or environment.

Piaget sharply distinguishes between the causes of play and the by-products or effects of play. He does not focus on the causes as has been tranditionally

done by play theorists, but rather on the effects. The two major effects of play he recognizes are (1) functional pleasure and (2) mastery. During practice play, the child repeats already acquired skills and activities for the affective feelings of pleasure and joy that it apparently gives him. An infant will repeat a movement, such as shaking a rattle, over and over again while exhibiting obvious signs of delight. When pleasure is absent in activiites which might be considered play, a reality-based attempt to learn may be prominent in the behavior. In Piagetian theory, play behavior arises only from previously learned activities; not during the acquisition of new skills.

As a child repeats new physical and mental abilities, he retains and ingrains them so that they do not become lost to him through disuse. This aspect of repetition is a "fixing" of new abilities in the child's repertoire, including cognitive functions. Through the ingraining, the child has then mastered the activity and can utilize it at a later time without going through the process of rediscovering it through random activity. In addition, Bruner (1973) describes play as having the effect of maturing some modular routines for later incorporation in more encompassing programs of action.

In addition to these two prime by-products of play, pleasure and mastery, Piaget describes several play behaviors which serve both as processes and products, and may be an aspect of mastery. These behaviors serve to reduce an unpleasantness in the child. One of these behaviors Piaget terms "compensatory combinations". which refers to behavior that improves or corrects reality by distorting it to fit more desired and agreeable thoughts. An example is a child who pretends to carry an infant in her arms after being told she must not touch a new baby sister. Reality is distorted to fit the child's needs.

The second behavior of play Piaget calls "liquidating combinations". The child, faced with an unpleasant situation in reality, may try to relive it in a play situation by transposing it symbolically and hence reducing the unpleasantness of the situation. A young child, having had an unpleasant experience of taking some medicine, reduces the negative affect of this situation by in turn pretending to give some medicine to her doll and repeating what had been said to her, "It will be all right. It will help you get well".

These two play behaviors, "compensatory combinations" and "liquidating combinations" consist of reducing or eliminating a disagreeable situation by reliving it in make-believe. Through symblic play, reality is changed and assimilated to the ego while freeing the ego from the demands of accommodation, or acceptance. These theories reflect Piaget's link with psychoanalytic models as they are closely related to modern psychoanalytic theories of play, especially those of Freud and Erikson.

Piaget, in *Play, Dreams and Imitation in Childhood* (1951), makes several references to Freud relative to symbolism and play behavior. The behaviors of "compensatory combinations" and "liquidating combinations", which reduce the unpleasantness of a situation, appear to stem from Freud's (1959) pleasure principle. This principle states that the course of events takes a direction so that its final outcome is to lower the tension of the unpleasant. Play provides the opportunity for assimilation, in the form of repetition, of an experienced event even when the experience was unpleasant. Through the repetition and the

assimilation to the ego, the event becomes more bearable and perhaps even pleasant. The phenomenon of behavioral repetitions Freud Terms "compulsive repetitions". Children repeat, in their play, everything from real life which has made a great impression on them. In so doing, they abreact the strength of the impression and make themselves master of the situation. The child can take an active role in play in situations in which he passively suffered previously. The unpleasant or disagreeable experience is then handed on to a playmate. The child in the active role is revenging himself on a substitute which brings mastery of the situation and pleasure to him. An example is the child, who suffered passively while the doctor looked down his throat, now assumes the active role of the doctor by pretending to look down the throat of a playmate. Through such play, a child is able to lower his anxieties by taking an active role in situations he had previously found painful. Hence, he is able to restore a sense of mastery to his reality.

Freud's ideas relative to play were expanded upon by Erickson (1950). Erickson proposes that the play of the child is the infantile form of the human ability to deal with experience and planning. Together, Freud's and Erickson's theories appear to be the basis for Piaget's play behavior of "liquidating combinations" in which unpleasant situations were relived symbolically and assimilated by the child.

Piaget's theories of cognitive development demonstrate that there are identifiable developmental patterns which are experienced by everyone. He sees all development proceeding in identical sequences, although the specific age may vary during which a particular stage occurs. Development progresses from the simple, the noenate, to the complex, the youth or adult. The child first deals with problems in his environment. When a situation is mastered, development proceeds toward the mastery of its corresponding abstraction. Piaget places these sequences, and others, within four major developmental phases of the child (See Figure 1.)

The sensorimotor phase of the child extends from birth to approximately two years of age. During this period, development depends primarily upon sensory and body-motor experiences. Piaget breaks the sensorimotor phase down into six separate and distinct stages. The onset or first appearance of play is difficult to determine. As early as stage two of the sensorimotor period, approximately one to four months of age, play appears to have become a part of the adaptive behavior. As soon as a motor skill is mastered, it can become play. When an individual repeats an activity in a happy display of comprehended behavior, play behavior is exhibited. This type of functional play is termed exercise or practice play, with the function of pleasure and sheer satisfaction. It is the most primitive form of play. The repetition of these skills in practice play involves no rules, symbols, nor make-believe. An example of exercise play would be the child having discovered by chance the possibility of swinging a suspended object, at first repeats the activity in order to adapt to it, to understand it. At this point, the skill has not yet been mastered, and the activity is not play. After the adaptation and understanding have occurred, the behavior pattern is repeated numerous times for the functional pleasure of confirming the newly acquired skill. This repetition for pleasure is play behavior. Exercise play continues

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Age (Years)	Developmental Stage	Type of Play	Play Group	Game Rule Practice	Game Rule Consciousness
0	I Sensorimotor	Practice (1-4 mos.)	Individual		
1		Ritualization (1 yr. 4-6 mos.)			
2	II Preoperational	Symbolic	Egocentrism an parallel	No Rule Unification	
3					
4					
5					
6					
7	III Concrete Operations	Games with Rules	Social	Cooperative	Sacred and Obligatory
8					
9					
10					
11	IV Formal Operations			Codified	Free rules which can be modified
12					
13					
14					
15					

throughout the sensorimotor phase.

During the fourth stage of the sensorimotor phase, play patterns emerge which Piaget calls ritualization. The child, exposed to the usual stimuli associated with going to sleep (pillow, blanket, sucking his thumb). Ritual play is preparation for symbolic play which begins during the end of the sensorimotor phase. Symbolic play is the second category of play. In it the child constructs signifiers or symbols and utilizes them to express his needs. Symbolic play is make-believe play. It implies representation of an absent object as there is a comparison between a given and an imagined object.

The second major phase of development, approximately ages two to seven years of age, Piaget calls the preoperational phase. The child discovers new symbols, the major one being language. he can imitate previous events, can search for objects, and begins to perceive the restraints of reality. Symbolic play reaches a zenith during the early part of this phase and replaces practice play. Through symbolic play, the child perceives more and more of life's situations. During the later part of the preoperational phase (ages four to seven), symbolic play continues. However, it is modified by new characteristics. Play becomes more orderly and organized. Imitations of reality are accurately and exactly performed. Players differentiate play roles, and organize them into complimentary actions. As the symbol becomes more closely adapted to reality, the ludic or play character becomes distorted. Instead of assimilating the external world to the ego, the child subordinates the ego to reality.

Phase *three* of development occurs between the ages of seven and eleven and is known as the stage of concrete operations. The child proceeds to manipulate symbols and to comprehend numbers, time and space. Symbolic play is replaced by collective games with rules as the child expands his social relationships. This stage of play is the most complex and the last to emerge. Piaget designates it as games with rules, involving social relationships. With the socialization of the young child, rules are needed to impose social order. The individual, acting alone in earlier play stages, has not needed rules. Play now acquires rules imposed by the play group. There are two major sources of these rules. They may be handed down as a cultural-social institution, from one generation to the next, varying geographically and changing somewhat from one generation to the next; or the rules may be spontaneous, created by the players.

The fourth and last phase of development Piaget describes is that of formal operations, occurring between the ages of eleven and fifteen. Play, as such, diminishes during this phase although games with rules continue. Childhood ends maturationally, and youth begins during this phase.

Piaget's term, "games with rules", includes games with sensorymotor combinations (races, ball games, marbles, etc.) and games with intellectual combinations between individuals; otherwise, Piaget states, rules would not be needed. The implication is that rules and competition go together. Hence, cooperative rule-governed games (hand clapping games, cat's cradle games), and ritualistic games are excluded from Piaget's analysis. In addition, individual games having rules, as opposed to group games, would also be excluded.

Piaget in *The Moral Judgment of The Child* (1932), has summarized studies of over one hundred children in their moral judgment or rules in a game setting.

namely, marbles. Two major phenomena were studied by Piaget and his colleagues: (1) the practice of the rules, by different age groups, and (2) the consciousness of the rules by age groups. Consciousness of rules refers to the child's concept of the origin and sacredness of rules, whether rules are obligatory and binding or whether they are subject to the whim or choice of the participant.

Relative to the phenomena of the practice of rules, children aged two to five, in the first half of the preoperational stage, often engage in parallel play with others. The child, while perhaps imitating others, plays "on his own". Players do not watch each other, nor do they unify their rules. This type of behavior, intermediate between purely individualized and social behavior, Piaget terms egocentrism (1932). Relay races planned for children would probably occur as follows: if the object is run to a line and return to the team, tagging the next runner, and if runner 1 of Team A had a large lead over runner 1 of Team B, runner 2 of Team A would wait for runner 2 of Team B to start. These children would perform in an individual race. The social or team aspect has not yet been developed.

Rules become practiced in a cooperative way sometime around age seven or eight. Common rules are observed, and the game becomes primarily social, involving social interactions. Finally, around age eleven, children begin to practice rules which are known and fixed by an entire society. The dominating interest seems to be in the rules themselves. The child, having mastered the rules, now takes pleasure in jurisdictional discussions and decisions. In the practice of rules, the child has progressed from independent play to parallel play, to the observances of rules or laws in a society.

Practice of rules differ from the consciousness of rules, in that practice involves what the child does, while consciousness deals with the origin of rules, and the degree of observance of rules. As soon as the child begins to imitate the rules of others, he begins to regard the rules of the game as sacred and untouchable. This attitude appears in most around age six. Prior to this time, the child has great difficulty knowing what comes from within himself, and what originiates externally or from others. When the child begins to respect adults, authority, and prestige, he becomes submissive to moral rules. Rules, hence, are perceived as sacred. A child will not invent a new rule nor accept a proposed rule change as fair. He would call rule modifications "cheating". Rules have intrinsic and absolute truth to them. A child, playing marbles, will not vary the area of play in size nor shape, will not vary the shooting method, and will not alter the sequence of play.

After age ten, the second half of the cooperative play stage, and during the codified stage of rules practice, a change in attitude or consciousness toward rules take place. A rule is no longer an external, absolute law. It becomes a free decision among players. Rules can now be changed if all the players agree - a democratic decision. Rules are no longer considered sacred, unchangeable from one generation to the next. Rules now depend on the initiative of the players. An example is the child who invents a new rule relative to marbles or some other game. Instead of shooting in the usual manner, variations of shooting or even dropping the shooter from above the marbles might be tried. The consciousness

of rules at this stage implies a freedom. Rules are no longer coercive, but something to be built up progressively. The adult origin of rules has ceased, and tradition is discarded. The consciousness of rules has progressed from sacred and obligatory observance to an autonomous creation of a collective group.

Piaget (1951) has stated that games with rules increase, both absolutely and relatively, with age. Research by Eiferman (1973) tests these theories. Eiferman found that both an absolute and a relative decline in participation in games with rules set in at a certain age, around eleven, instead of continuing to increase. Piaget describes a decline in practice play after age two. Eiferman's research, on the contrary, reveals an increase in unstructured play and practice play around age twelve to fourteen. This rise in practice play is part balances out the decline in games with rules.

While assimilation, as one aspect of adaptation, gives rise to play, the primacy of accommodation gives rise to imitation. The imitator is concerned with producing an exact account of the reality of the situation; hence, reality does not change, but the initator himself changes. In imitation, the child attempts to copy either the action itself or the representative symbol of the action. The child might imitate the parent's work or he might imitate the same action to convey the idea that he is "going to work" like his parent. Through imitation, symbolic signifiers are developed which become part of representation.

Piaget views the balance between accommodation and assimilation as the basis for intelligence. This equilibrium is not static, especially in the child. Assimilation can predominate, with play being primary. Or a primacy of accommodation produces imitation. An act of intelligence or cognition in which the two processes are in balance or equilibrium constitutes intelligent adaptation. An individual experiences events, his cognitive structure increases in complexity. The person accommodates his thinking to account for the new experiences. Changes in assimilation (play) in the child produce new accommodations, and the accommodation changes (the internal changes) alter the overall cognitive schemata, which in turn affect the constraints of assimilation. As assimilation and accommodation interact, cognitive change hence occurs. Each adaptation paves the way for its successor.

During the early sensorimotor period, the child is engrossed in sensorimotor activities. As skills are mastered, they are repeated in play for pleasure. Play at this time is purely functional. From this stage evolve activities done "knowingly". Ends become differentiated from means. The development of symbols and symbolic play serves to consolidate and enlarge the child's previous acquisitions. The child, through symbolic play, is brought into contact with the questions and objects of everyday life. Meanings are developed and attached ot the signifiers or symbols, which then leads to representation. The ludic symbol itself is integrated in intellectual activity to the extent to which the symbolism is a preparation for construction of representation. Free assimilation becomes creative imagination.

Play, as the primacy of assimilation over accommodation, is seen in practice play, symbolic play and games with rules. During the course of development, new acquisitions become less and less numerous, and practice play diminishes. As the child attempts to adjust to reality rather than to assimilate reality, symbolic play and play in general diminish sometime between the ages of eight

and twelve. Games with rules persist at the adult stage. These have become socialized games, still controlled by rules. Play, as Piaget defines it relative to assimilation, is not part of these games. Within this context, the adult does not play. However, further thoughts on this topic by Piaget would help clarify the existence or non-existence of ludic behavior in the adult. Does Piaget really believe that adults do not play?

Other theorists of play differ from Piaget by contending that play is a vital function in socialized adults as well as children. Huizinga (1950) sees play as a permeating element not only in games and some modern sports, but also in most cultural activities. His treatise, *Homo Ludens, A Study of the Play-Element in Culture*, traces the play element from the earliest cultures to the present. The play element finds expression in a variety of social cultural forms, across most cultures, and in all age groups. Play does not diminish after developmental phases are completed. Research studies by Roberts and Sutton-Smith substantiate the importance of play and games in cultures.

In dealing with play in the Piagetian sense, the definition of play must be kept clearly in mind. Adjectives commonly seen in many definitions by other play theorists, such as fun, happy, free, spontaneous, regulated or separate are not a part of the Piagetian definition of play. In order to understand Piaget's concepts of play, one must literally accommodate or change his concept of play to a primacy of assimilative behavior. To resist this acceptance of Piaget's concept results in a failure to understand the contributions of Piaget in the realm of play and cognitive development. Piaget has carefully defined his terms, and has applied scientific methods through succinct observations to his work in child development. It is vital that his definitions and concepts be clearly understood prior to any efforts to test his theories. Through his varied background and experiences as a European scholar, through his years of research into child development, and through his prolific publications, Piaget has created and described a model of play in cognitive development which is the most comprehensive work in this area to date.

To summarize, Piaget views play as a primacy of assimilation. Play is divided into three categories: practice or exercise play, symbolic play, and games with rules. Rules practice develops into cooperative, then into codified rule practice. Rules, when incorporated into games are first considered obligatory and sacred, but later become freer with modifications being common. The by-products of play are functional pleasure and mastery, including the affective mastery of unpleasant situations. Play begins before the first year of life is completed and diminishes between the ages of eight and twelve as the child adapts to reality. Play, as assimilation, produces meanings and symbols which become part of representation. The oscillations between assimiliation (play) and accommodation (imitation) produce cognitive changes which eventually lead to an equilibrium between them and to intellectual adaptation. Play occupies a major role in the cognitive development of the human being.

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PIAGET-BASED EARLY DEVELOPMENTAL EXPERIENCES IN PHYSICAL RECREATION AND PHYSICAL EDUCATION

Joseph P. Winnick

INTRODUCTION

This paper is designed to suggest programming implications for physical education and recreation on the basis of Piagetian Theory. The implications which will be presented relate to the sensorimotor and preoperational periods of cognitive development and are suggested for children who need an environment which will nurture cognitive development because they have not attained basic cognitive abilities. The causes for such lack of development may be due to mental retardation, social or economic disadvantages, emotional problems, or physical disabilities. A basic assumption is that if children do not posses these basic abilities, they can be developed in a program designed for that purpose is created.

Since the early years of this century, it has been asserted that one of the benefits of physical education is its contribution to mental development. Leaders in the field have asserted that mental development would be enhanced by activities such as learning the rules and strategy of games and sports, studying the history of dances and sports, and learning the physiological and/or anatomical principles involved in physical activity. The apparent association of such activity with mental development is that such experience involves cognitive activity.

In more recent times, the importance of a motoric or physiological base for academic achievement and, in some cases, intellectual development has been proposed by writers such as Kephart (1960), Frostig (1964), and Barsch (1965). Of interest to this topic and the commonality in these writings is that motoric or physiological activity is beneficial for the development of abilities which are necessary for academic achievement or intellectual development. A third view of the contribution of physical and motor activities to intellectual development, which is perhaps more extreme and less substantiated, has been the theory and practice of neurological organization presented by Delacato (1963). In this work, prescribed motor activities purportedly contribute to the development of optimal cortical dominance and therefore improve intellectual functioning of the organism.

Although perhaps more intuitive than theory-based, the problem solving approach has been favored in physical education by those who feel that thinking is a major educational goal. The underlying assumption is that problem solving

stimulates thinking and therefore enhances cognitive activity. An inadequacy with this and other approaches involving increased cognitive activity, is that cognitive activity may be necessary but is not a sufficient condition for cognitive development to occur. In his latest works Cratty (1971, 1972, 1973), advances from cognitive activity toward cognitive development by presenting games which contribute to elements of intellectual development which have been identified or suggested by writers such as Bruner, Guilford, and Piaget.

At this point, it appears that further advancement would be enhanced by the identification of a hierarchy of cognitive development and the arrangement of physical education and recreational experiences on the basis of such a hierarchy. Hopefully, such physical education and recreational experiences would serve as a stimulus for cognitive development. If such an idea has merit an important early step would be to develop or accept one or an eclectic theory of cognitive development. The developmental implications for physical education and physical recreation of such a theory would need to be examined. The material which follows suggests programming implications for physical education and recreation from the literature for children functioning at sensorimotor and preoperational stages as identified in Piaget's theory of cognitive development.

PROGRAM IMPLICATIONS SENSORIMOTOR PHASE

During the sensorimotor phase, knowing is bound to personal external action. Children functioning at this level adapt and modify basic reflexes, extend basic reflex patterns to form new schemata, and utlize acquired behavior patterns to produce effects on the environment. During the latter period of this phase, children distinguish means and ends, utilize familiar schemata for problem solving purposes, engage in trial and error experimentation, and fianlly symbolically plan actions or events before carrying them out externally.

The separation of self from external objects appears to be basic to successful sensorimotor development and, where appropriate, should be established as a basic goal of a developmental program. Unless extremely deviant, children will be able to make such distinctions by the time they come in contact with professional recreators or physical educators. If necessary, distinctions between self and external environment can be enhanced by having children reach for, push, pull, feel, smell, taste, hear, and follow objects in the environment. At other times, the immediate environment may be manipulated to produce effects on the individual. Examples include washing the child, placing the child in a wading pool, rubbing the heel of the child with a rough cloth, and stimulating the child in warm inter-personal interactions.

Separation of self from the environment enhances exploration of and learning from the environment, however, he needs to possess the ability to move and to move efficiently. The ability to move efficiently requires strength, balance, the ability to create appropriate muscular tensions, flexibility in movement, and rhythmic movement. A remaining need is the ability to plan movement. Once the child possesses the ability to explore his environment, he is ready to further receive valuable information from it through is sensory neural mechanisms. Since movement ability, movement efficiency, and sensory feedback are critical to exploration and discovery and since exploration and discovery are critical to

sensorimotor development, the importance of movement is apparent. In addition, since movement is a schema and since schemata are forms of knowing, it logically follows that mastered movement can be viewed as "knowledge". Thus, the movement abilities may be viewed as ends to be attained as well as a means for environmental exploration. Since program activities which develop strength, balance, gross motor control, movement flexibility, and rhythmic movement are sufficiently available in the literature, no further delineation will be presented here.

The appropriate pedagogical approach to enhance development at the sensorimotor level appears to be problem solving and discovery. Such activity might be related to external objects as well as to the child's own body and its capabilities.

Also important to this period is language development. Relative to their linguistic environment, the presentation of positive language models, the opportunity to speak, the motivation to speak, are essential. The activity of the child should be action oriented (learn by doing) and, at this level, individual rather than group oriented. The activities associated with this phase are not new to educators or parents, but, simply remind them what a normally developing child experiences. They are activities frequently associated with the play of a child. Play at this level provides an opportunity for the child to assimilate an external event to a schema of knowing.

As the child moves through the sensorimotor period, play becomes an expressive function, an opportunity for imitation, an opportunity for pretending and essentially the primary tool for adaptation. Play leads the child from egocentricity to communication and subsequently, to socialization.

PREOPERATIONAL PHASE

Prior to the drawing of implications relative to the preoperational phase, it is necessary to draw an educational framework or model from the massive work of Piaget. Lavatelli (1970) proposed that a curriculum could be planned which would be centered on classification, space and number, and seriation and presented implications based on this model. The framework to be utilized as a point of departure here is based on the work of Constance Kamii and Norma Radin (1970). These authors feel that the two areas which are very relative to curriculum design are logical knowledge and physical knowledge. The first, logical knowledge, consists of logico-mathematical operations and spatial-temporal operations. Logico-mathematical operations deal with classification, seriation and numbers. Spatio-temporal operations deal with spatio-reasoning and temporal reasoning. The second broad area, physical knowledge, refers to the child's knowledge of the nature of matter. The child learns about the nature of matter by acting on objects and viewing, analyzing, and synthesizing the results of these actions. In order for the child to structure his knowledge and symbolize it, Kamii and Radin select representation as the third area within their framework. These authors summarize three types of external representation distinguished by Piaget as follows (p. 98):

A. Indices

1. Part of the object (e.g., the bottom of the bottle)

2. Marks casually related to the object (e.g., foot marks in the snow)

B. Symbols
   1. Imitation (the use of the body to represent objects, e.g., walking like a duck)
   2. Make-believe (the use of objects to represent other objects, e.g., using a box to represent a duck)
   3. Onomatopoeisa (e.g., uttering "quack, quack")
   4. Three dimensional models (e.g., making clay ducks)
   5. Pictures (e.g., drawing ducks)

C. Signs
   1. Words and other signs (e.g., algebraic signs)

Development at the preoperational level would be enhanced by an environment providing opportunity for qualitative classification. At this level, there is agreement in the literature that classification experiences emphasizing qualitative aspects without class inclusion are appropriate. The progression begins by dichotomizing and trichotomizing objects according to their similarities and differences. Such opportunities in physical education include arranging or selecting games where balls of different color, sizes, shapes, and texture are grouped; arranging games or movement experiences where movements such as walking, running, hopping, and jumping are involved and distinguished; selecting games and movement experiences where squares, triangles, circles or other geometric forms are utilized and distinguished; arranging obstacle or confidence courses which provide an opportunity for children to perceive similar and varying qualities in objects (slanted, moveable, suspended, rolling) and which stimulate varied movement responses such as climbing, jumping, creeping, balancing; selecting games and rhythmic activities which stimulate auditory discrimation, and mimetic activities where children learn to identify, imitate, and distinguish various animals.

Kamii and Radin (1970) propose that prerequisites to operational seriation include the ability to dichotomize and trichotomize things in proper order. These authors point to the desirability of using a variety of materials and sensorimotor activities to teach the prerequisites for seriation. Opportunities for such activity are unlimited in the physical education or recreational environment. Opportunities may be created by children to order each other in terms of height, weight, and girth. They have many opportunities to seriate forms they create with their own bodies or with others. Examples include forming progressively larger geometric shapes and progressively larger or smaller letters or numbers with their body or with other children.

From this beginning, implication for further programming may be drawn from the following steps leading to operational seriation developed by Lavatelli (p. 138:

A. Arranging ten or more items in a series according to one variable only.
B. Arranging items in a series according to more than one variable.
C. Inserting an object into an already completed series (develop concept of an inserted object as the middle object in a series of three, rather than as a member of a pair of objects)
D. Solving a double seriation matrix

E. ievement of transitivity.

Progress toward operational seriation following the attainment of prerequisites will be dependent upon the success with which the child attains the progressive steps presented by Lavatelli rather than the type of activity engaged in. The types of activities already identified with prerequisites may be continued. The important pedagogical consideration is that the teacher or leader presents problems which will stimulate further cognitive development.

The structure of numbers is the next element included within the rubric of logical operations. There is agreement in the literature that the child developmentally proceeds from intuition about groups to reversibility and that the foundation for number structure is an understanding of equivalents. Children in schools who need such a foundation may be provided experiences in game situations to match objects. For example, opportunities may be provided to match projectiles with striking elements, e.g., softball bats with softballs, badminton rackets with shuttlecocks, or hockey sticks with pucks. Opportunities may be provided where children may be paired by variables such as height, sex, and weight or where children are distinguished in their ability to perform physical feats such as jumping for distance or height. The concept of equivalence may also be heightened by division of objects or groups of children into sets of equal number. Games such as Busy Bee or Squirrel in the Trees are examples of games where the number of persons in a group are equivalent.

Relative to numbers, it is important to emphasize that preconceptual children base their ability to quantify on spatial considerations. Normally, a child would have no difficulty choosing a group of ten balls over a group of three balls. However, since the space occupied is the same, he would have difficulty in choosing between a group of ten balls and a group of eight balls if the balls were arranged in rows of equal lengths. Such children have not developed the concept of conservation which may be stimulated in a variety of ways in physical education. Children may be stimulated to understand that the weight of their own bodies is invariant when they make themselves as small or as large as possible; that the number of persons does not change when they all move in a perception box even though the area occupied is smaller.

Sonquist, Kamii, and Derman (1970) feel that children are helped to overcome their tendency to base numerical judgement on space by the teaching of linear ordering. These authors feel that such activity helps the child to focus on each object separately and prevents them from basing judgment on the space occupied. Linear ordering is evidenced in games where children observe a movement a child makes and are asked to imitate the movement and add a movement for the next child to imitate.

One of the very direct contributions of physical education or movement activites is the area of spatial reasoning. Concepts of space are developed in infancy as children reach and move toward and away from objects. As such movement occurs, muscular tensions and exertions kinesthetically provide information to the child about the location and distance of object. Movement enhances the opportunity to group objects in space and to view objects from different perspective For example, a child learns about size constancy of a football even though the image reflected on the eyes varies in accordance with

distance from the object. Through countless movement experiences children develop egocentric localization, i.e., the ability to locate objects in relation to oneself, and an awareness of one's body in space. As the child moves through the preoperational period he develops the ability to "decenter" as he gains the ability to locate objects in relation to each other.

At the preconceptual level, the child needs opportunities to develop basic space concepts and to recognize space shapes those abilities may be developed by having children move through, around, over, under, inside, outside, on and off shapes made by the teacher from cardboard or made by children out of rope. The literature contains unlimited additional games and activities.

In order to develop basic abilities of spatial reasoning, children need opportunities to move in a stimulating environment. Such an environment would include objects of different sizes, shapes, colors, and sounds. Games or activities conducted with balls, balance beams, barrels, perception boxes, ropes, hoops, tires and vaulting boxes may provide such opportunites. Obstacle courses or follow the leader games may be developed which involve all basic spatial concepts at the level of the child's ability. Other favorite activities for the development of basic spatial concepts are trampolining (or bed jumping), tumbling, and swimming.

Temporal reasoning may be enhanced in a physical education curriculum by having children create and conduct locomotor or other movement activities in a sequence or having children reproduce movements demonstrated by the teacher. Progressions may be developed by increasing the number of activites performed in a series and increasing the complexity of patterns. To add enjoyment, games may be selected which require temporal sequencing or memory. Children may be motivated to move through an obstacle course in a particular way or to perform routines on a tumbling mat or trampoline. Finally, causal activities where children are asked to predict the consequences of actions are recommended for the development of temporal reasoning. For example, children may be asked what would occur if balls were rolled against the wall as varying degrees of force were applied or what would occur if a ball was dropped from varying heights.

The hierarchy presented by Piaget, summarized by Kamii and Radin, and presented early in this paper relative to representation appears to be succificiently explicit to draw implications for movement experiences. Development of representation at the index level will be enhanced by providing opportunities for children to view objects from various perspectives. Activities previously presented to develop basic spatial concepts could appropriately be arranged to stimulate opportunities for viewing objects from different perspectives. Student for example, may move over, under, around, through, and between objects arranged in an obstacle course, placed in a gumnasium, or found on a developmental playground. Games and activities in which children must perceive objects other than through the visual sense are also helpful experiences at the index level. For example, blindfolded pupils may be asked to play games where they move toward various sounds or where they need to distinguish balls of different texture or hardness.

At the symbol level, experiences can be arranged in which the child uses his body to represent objects. Examples include having children imitate cartoon

characters, animals, airplaines, trains, cars, toys, or positions formed by dolls. Children frequently enjoy forming letters of the alphabet or numbers with their own bodies or cooperatively with other children. Children may also be stimulated to present objects with other objects. For example, the bed of a trampoline may represent the surface of the moon, a balance beam may represent a bridge to be crossed, a ball may represent a bomb to be avoided, a scooter-board may represent a train. As the child engages in games and activities in which he imitates and represents objects, he may reproduce sounds associated with the objects. Subsequently, games may be selected in which children need to guess objects as a result of descriptions made by gestures and/or sound. Story plays in which children are stimulated to pretend that they are objects or animals and are stimulated to act out or dramatize these representations would also be appropriate. Also helpful would be activities in which children are asked to produce movements depicted in pictures.

In order to enhance development at the sign level, opportunities need to be provided for communication through language, movement, and gestures. Such opportunity would be found in games which enable children to enlarge their vocabulary and increase their comprehension of language. Examples of activities to improve an understanding of comparative prepositions have already been mentioned. Also beneficial are games and activities where children recite rhymes or chants such as in Charlie Over the Water, or rope jumping; games and activities where motor activity is initated (Run Rabbit Run, Hill Dill, Brownies and Fairies), changed (Streets and Alleys) or ended (Red Light) by language cues; games and activities requiring letter, word, symbol, or pattern recognition. Imitation of acceptable verbal communication as well as the opportunity for such communication in small groups or play settings is vitally important.

During the preoperational period, the child continues to develop physical knowledge or his knowledge of the nature of matter by moving within and exploring his environment. Learning through discovery is of paramount importance to the child. Through feel, the child gains information about object properties such as texture, size, weight, and resiliency. From this background a teacher can stimulate language development by having the child learn comparatives such as rough-smooth, light-heavy, large-small, and hard-soft. Further physical knowledge is developed by having children act upon objects and observing the effects of such actions upon objects. In physical education or recreation programs children have opportunities to drop, thrust, pull, push, bend, twist, punch, squeeze, or lift objects possessing various properties. They have an opportunity to compare the effects of their actions on similar and dissimilar objects and begin to systemize the effect of their actions. As was true for temporal reasoning, there is also agreement in the literature that opportunities be created for predictive purposes in order to increase physical knowledge. Again, students may be asked what would happen if a ball was thrown against a wall or to predict the rebound effect of deflating a ball. From the ability to predict, children would be asked to explain the cause of an action at higher levels of cognitive development.

It is important to realize that the child's abilities during the preconceptual stage depend to a great extent upon perception. During this period, perceptual

abilities continue to develop but since they are not yet combined with conceptual development, the results may be inaccurate or distorted judgements will be made. Many activities already identified in this paper contribute to the enhancing of perception and additional ideas may be easily found in the literature. Suffice it to say in this paper that opportunities for development would be in accord with Piaget theory. However, it is important to note that, from the standpoint of cognitive development, accurate understanding of the environment occurs when perception is combined with "knowing" or conceptual activity.

PERSPECTIVE

The program activites or the developmental theory discussed herein are not new. The unique role of the teacher in cognitive development has been presented in many other works and is appropriate for physical educators or recreators. It is recognized that if this paper makes a contribution, it is the attempt to coordinate physical recreational or physical educational experiences with phases of a selected developmental theory.

However, there is another strength and weakness of this paper. It is based and relies on a framework which has been designed for classroom teachers. It is a strength for interdisciplinary cooperation. But, is it a model most relevant to the unique contributions of physical education and physical recreation?

In closing it is important to stress that the experiences suggested in this paper are frequently not as critical to cognitive development as the methodology employed by a teacher or recreational leader. It is important to not only arrange experiences which will stimulate development but also to interact with pupils, pose questions that require cognitive understanding and serve as a model for imitative purposes. Those frustrated in attempts to visualize the "appropriate" setting should perhaps simply observe normally developing younsters below the age of six in play situations. This would probably best serve to palce experience in their proper perspective.

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APPLICATION OF PIAGETIAN CONCEPTS TO PHYSICAL EDUCATION*

Ronald French and Noel Shakeshaft

In the past decade there has been increased attention to the role of physical education enhancing academic and/or intellectual development of the child. Three major approaches for the utilization of physical education as means to academic and/or intellectual development have emerged: (1) structured group games, (2) movement exploration, and (3) combined facets of structured group games and movement exploration. The purpose of this paper will be to briefly discuss these approaches and then propose a fourth based on Piagetian Theory

1. Structured Group Games

Numerous authors (Humphrey & Sullivan, 1973; Wedemeyer & Cejka, 1971) have developed structured group physical education games which primarily incorporate academic skills. In other words, most of the games involve recognition components as contrasted to games which incorporate recognition and conceptualization (comprehension). The criteria utilized for the participation in the games is the child's handicapping condition, his grade placement or his specific academic deficiency.

2. Movement Exploration

Movement exploration is an individualized approach to physical education that has been utilized to enhance intellectual development. Some of the major objectives of this approach include (Tedgwell, 1969):

A. Improve the child's understanding of his body, its parts, and how it functions in his environment.
B. Heighten the child's awareness of the sensitivity to his environment by the provision of multi-sensory stimuli to movement.
C. Improve the child's perception and connection of his environment by increased use of the tactile and kinesthetic senses.
D. Help the child to gain a knowledge of himself and sensitivity to others around him.

Although this approach has been influenced by the thoughts of several developmental theorists, the movement exploration approach is not aligned with a specific theory of intellectual development but eclectic in nature. In contrast to the group game approach, the criteria for participation in the movement exploration activities is the child's level of intellectual functioning (Hackett & Jenson, 1966 Harvat 1970) not type of handicapping condition, grade placement or academic deficiency

3. Combined Group Games and Movement Exploration

This approach (Cratty, 1973) integrates the objectives and methods of movement exploration and structured group game approach to physical education. Similar to movement exploration this approach has been influenced by numerous developmental theorists and "no attempt has been made to explore in detail the various cognitive models" (Cratty, 1973, p. 9). Further, this approach includes not only individualized activities but structured group games that incorporate recognition and conceptual components. The criteria utilized for the participation in the games is the child's handicapping condition, his grade placement or his specific academic deficiency.

4. Piaget-Based Conceptual Physical Education

Implications for physical education programming which utilizes Piagetian Theory has been suggested by Winnick (1974). The purpose of this paper will be to present gross-motor activities which may serve as a stimulus for cognitive development based on this theory.

The activities which will be presented relate to Piaget's Preoperational Period. This period encompasses the approximate chronological ages for intellectually normal children (Robinson & Robinson, 1965) and mental ages for intellectually subnormal children (Reiss, 1967; Stearns & Borkowski, 1969; Woodward, 1959) from two through seven years.

Some of the major conceptual limitations of the child functioning at the Preoperational Period can be classified under the following headings (Phillips, 1969; Robinson & Robinson, 1965):

A. *Egocentric*--the child does not possess the ability to adopt a variety of points of view of a problem. The "Self" is the center of all things and the child is relatively unaware of others points of view.

B. *Concreteness*--while the child can function in a representational world, he believes everything is exactly what it seems.

C. *Centering*--the child focuses on the most compelling attribute of a problem; he cannot integrate a variety of stimulus characteristics of a problem.

D. *Irreversibility*--the child is unable to reverse, without major distortions, a chain of thought elements.

E. *States versus transformation*--the child tends to focus on the successive states of a display rather than on the transformations by which one state is changed into another.

F. *Transductive reasoning*--rather than proceeding from the particular to the general (induction reasoning), or from the general to the particular (ductive reasoning). This level of thinking lacks a hierarchy of categories resulting in a lack of refinement and mobility in the child's thinking.

Because of these limitations, the child operating in the Preoperational Period is unable to solve a variety of conceptual tasks which have been developed by Piaget (Flavell, 1963). Some of these conceptual tasks are defined below with the specific conceptual limitations listed. Games and activities which may be

utilized to enhance the ability to solve the problems are subdivided into those activities that may be accomplished in the gymnasium and on the field and those that may be accomplished in a swimming pool. The criteria utilized for the participation in the activities is dependent upon the child's level of cognitive functioning and motoric proficiency, not the handicapping condition, his grade placement or his specific academic deficiency.

Games and Activities

I. Conservation of Numerical Correspondence

Conceptual Problems:

A. Definition--the ability to establish a one-to-one correspondence between sets of objects. This problem involves limitations: centering, states versus transformations, concreteness, irreversibility and transductive reasoning.

B. Playground and gymnasium games and activities to enhance the cognitive development of numerical correspondence.

1. Tire and Bean Bag Games:

Equipment: Six tires and ten bags of different sizes and shapes.

Procedure: Place tires and bean bags in separate but parallel rows of the same length fifteen feet away. Throw a bean bag into each tire.

Variations: Place bean bags in a row farther apart than tires, in a bunch, or vary the number of tires and/or bean bags. Instead of throwing the bean bags, carry bean bags to each tire while hopping, jumping, skipping, or galloping.

Concept: Instructor asks the child which row has more. After he decides, ask the child to throw a bean bag into each tire. After he completes the task, ask the same question. Instructor may ask the child to explain how he knows that there is one too many or just enough tires or bean bags.

2. Find a Ball

Equipment: Equal number of bats and balls of various sizes, shapes, and colors.

Procedure: Dependent upon the level of cognitive and motor functioning of the child, place a certain number of bats on a line forty feet from starting line. The child must look at the bats then run down to the balls (twenty feet from the starting line) and select a ball and match it with a bat. Continue pairing bats and balls by site, shape or color.

Variations: Place bats in a pile or spread then farther apart. In place of running, do animal walks, skip, or gallop. Vary the number of balls or bats presented to the child. Also place bats and balls together with one or more extra balls or the same number. The child must determine if there are just enough balls or too many

Concept: Instructor asks the child which row has more objects. After he decides, he runs and attempts to match. After he completes the task, ask the same question. Instructor may ask the child to explain how he knows that there are too many or just enough bats or balls.

C. Games and activities which may be conducted in the swimming pool to enhance the cognitive development of numeral correspondence.

1. Corks and Things

Procedure: Place all the children at side of the pool, in or out of the water. Teacher tosses all objects into the water (shallow and/or deep end, depending upon swimming skills of the children). Directions are given that upon signal all students go out and collect as many objects as they can. When all objects have been collected, children bring the ones they retrieved back to the side of the pool.

Concept: Pair children and ask them to decide, in each pair, which of them has retrieved more objects. Ask them to explain the "why" of their answer. Then direct children to see if their answer was correct by pairing up each object they have with one of their partner'. For example, child #1 may have 12 golf tee and child #2 may have 7 ping pong balls. The balls may occupy more space and appear to the child as a larger amount. Once paired with the golf tees of child #1 it may be shown who has the most. As the mastery of this concept occurs (later part of the concrete preoperational period) the use of symbolic representation (numbers) may be employed to abstractly reach conclusions rather than pairing objects to derive at a solution. Introduce symbols for numerical representation.

2. Flying Saucers

Equipment: A number of inner tubes of two different sizes and a stop watch.

Procedure: Children form two teams. An equal number of inner tubes is given to each team (one team the larger inner tubes, the other the smaller). Upon signal, have one team throw their inner tubes across the pool, swim to them (or walk, hop, jump, etc.) and throw again until tubes are to the opposite end or side of pool. Time how long the first team takes to complete task. Repeat for second team.

Concept: Tell children which team took longer. Ask them if one team has more inner tubes than the other team (let them look at each team's pile of inner tubes at completion). Allow them to match tube for tube from each team to determine answer. Concepts of time, movement, and velocity may also be interjected (vary course each team takes, and/or distance to finish line).

II. Conservation of Quantity

Conceptual Problem:

A. Definition--The ability to conceptualize that the amount of space occupied by an object remains constant although the structure of the object is altered. This problem involves these limitations: centering, states versus transformations, concreteness, irreversibility and transductive reasoning.

B. Playground and gym activities to enhance the cognitive development of conservation of quantity.

1. Objects in spaces

Equipment: Balls of same sizes

Procedure: Child throws balls different distances.

Concept: Before the child throws the ball the instructor asks the child if the balls are the same size. When he agrees, ask him to throw the balls varying distances. After the completion of the task then ask the same question now that perceptually the balls further away are smaller. Instructor may ask the child how he knows that they are too big, smaller, or equal in size.

2. Jump Rope Activities

Equipment: Jump ropes.

Procedure: Make 2 circles using 2 jump ropes and perform these activities.

a. Put all your body inside.
b. Balance on three (one or two) body parts inside the circle.
c. Jump outside the circle forwards, sideways and back.
d. Combine activities in #2 to make a sequence of activities.

Now make another shape using the jump rope and attempt the same activities.

Concept: Instructor asks the child if the shape of the crope in the first activity takes up more, equal or less space when compared to the other shape. Instructor may ask the child how he knows they are equal, smaller or larger in size.

C. Games and activities which may be conducted in the swimming pool to enhance the cognitive development of conservation of quantity.

1. Shapes and Sizes

Equipment: None.

Procedure: All children join hands throughout activity. Two groups, each having the same number of children should be formed. Both groups begin by forming circles. Upon the command "change size" or "change shape", the group to which the teacher points makes a smaller or larger circle or forms a new shape, such as a triangle. Game continues

with changing size or shape. Children may then be directed to jump into that shape, or hop, or skip, etc. through the water as they change size or shape. Advanced swimmers may participate in the deep water.

Concept: In the beginning of the activity it should be pointed out to the children that the two groups are the same; both groups start the same. After a command to change size or shape ask the children if the groups are still the same even though there has been a change. The group which changed may be asked to change back to the original size or shape to demonstrate the conservation of the space inside the shape and irreversibility. Children keep their arms outstretched throughout the activity and the volume inside never changes irregardless of the shape but will change when the same shape changes size.

2. Flutterboards

Equipment: Flutterboards numbering one and one half times the number of participants, scales.

Procedure: Separate the number of flutterboards into three equal stacks, have children pick up the stacks, examine them and determine that all three are the same and that each stack is equal in weight. Weigh each stack if necessary to demonstrate their equality. Participants form two teams and a stack is given to each. The team takes the stack back to the starting point. Upon signal one member of a time from each team conveys one kickboard to the other side in a designated manner. The object of the game is to construct a different shape from the original with the flutterboards.

Concept: Teacher asks if all three piles are still the same weight even though they are now arranged differently. Ask participants to explain their answers. Weight stacks again is necessary.

III. Numbering

Conceptual Problem:

A. Definition--Synthesis of two operations (1) cardination which involves the answering of the question "How many?" and (2) ordination, the arrangement of objects in a series. This problem involves the limitations of reversibility and concreteness.

B. Playground and gymnasium games and activities to enhance the cognitive development and numbering.

1. Bottle and jars

Equipment: Different size jars and bottles with twist off tops.

Procedure: Jars and tops are placed 20 feet from child. The child, must jump, hop, run, gallop to jars then run back to starting line.

Concept: While by the jars:

a. Place the jars in a series from small to large.
b. Place the tops in a sequence from small to large.
c. Place tops on the correct bottles.
d. Answer the question "How many?"

2. Jump and Reach

Equipment: Chalk.

Procedure: The first child reaches high with both hands held together and makes a mark on the wall with the chalk. He then stands sideways to the wall with the chalk held in the hand next to the wall. As he swings both arms, he jumps in the air. At the highest point of the jump he makes a second chalk mark on the wall. Other children perform same procedure.

Concept: Based on the distance between standing height and jumping height, compare and place in series from short to tall. The instructor may want to cut out strips of paper, corresponding to the height of each jump.

C. Games and activities which may be conducted in the swimming pool to enhance the cognitive development of numbering.

1. Races

Equipment: None

Procedure: Have children move in a designated manner (hop, jump, swim on back, swim underwater, etc.) from one side of pool to the other. The teacher keeps a record of the child who comes in first, second, etc.,.

Concept: Point out to the children the order of arrival. Place children in this order, the first child next to the child who was second, etc., re-run the race, and discuss results. Have children count off upon arrival and then arrange the order themselves.

2. Get It

Equipment: Same number of identical objects for each team (one object for each child on the team). These may be balls of different sizes and/or colors.

Procedure: Relay type activity in which one player at a time from each team travels to the pile of objects at the other side of the pool (various methods of traveling across pool may include, walking, hopping, swimming in a particular fashion, etc.) Each child on each team in turn goes across pool and gets the "biggest" of the objects in his team's pile. He brings it back and the next team member goes. A point is scored for the team which finishes first.

Concept: Award a point to each of any of the teams which selected the objects in the correct order so that when the team has finished the object each child holds should be

progressively smaller than the object which the preceeding child holds. The number of children on a team and objects used should be small. If necessary a team may consist of one initially progressing to two, etc. with corresponding number of objects. When "team" is only one person you may wish to have two objects so the child is forced to select. In all the races you may wish to have one more object than number of children on the team so even the last child must choose. In the buginning, the difference in objects should be large. As the concept seems to be grasped additional objects may be added with less obvious discrimination between them. This may also be done with colors, such as black, grey, and white. When a team has finished the color of the object each child holds should be progressively lighter than the color of the object which the preceeding child holds. Add varying shades between these as children progress.

3. Stack Them

Equipment: Rubber inner tubes of varying sizes: trailer, 20" bicycle, 24" bicycle, cars, trucks, tractors.

Procedure: Each player is given an inflated tire tube. Upon signal, whoever, has the largest tube brings it (in a disignated manner) to the center of the playing area of the pool (use shallow end for non-swimmers and deep end for swimmers). The person(s) possessing the next largest tube brings it and stacks it upon the first, etc.

Concept: Check for accuracy. Have children explain their answer.

Variation: Have each child sit in the tube which he was given. Direct them to scatter throughout the playing area of pool. Upon signal they paddle together forming an ordered line of tubes from smallest to largest. If ther are sufficient tubes, do this in a race by teams (water polo hats may be worn to identify team members). Encourage evaluation of resulting order of tubes to come from the children. Let them correct any mistakes. For the less cognitively developed children decrease the number of tubes used (perhaps begin with only two sizes). As the understanding of the concept seems to increase, increase also the number of size tubes used.

IV. Composition of Classes

Conceptual Problem:

A. Definition--ability to organize classifiable material into a hierarchy of classes and subclasses founded on similarities and differences among objects. This problem involves the limitations of centering, irreversibility transductive reasoning and concreteness.

B. Playground and gymnasium games and activities to enhance the cognitive development of composition of classes.

1. Blonds, Brunettes and Redheads

Equipment: None.

Procedure: Instructor calls out either blonds, brunettes, or redheads. If he calls blonds, only blonds follow his directions, i.e., all blonds do four jumping jacks.

Concept: Instructor may add other hierarchial classifications to game such as boys, girls, children. Instructor may ask questions such as "Are there more Redheads or boys?"

2. What's the Difference?

Equipment: None.

Procedure: The teacher executes a sequence of movement patterns (jump forward, a hop backward once, jump sideways, hop forward once, jump forward three times).

Concept: Children attempt to imitate the sequence. Children attempt to classify sequence into categories such as all movements were forward or backward except for one that was sideways.

C. Games and activities which may be conducted in the swimming pool to enhance the cognitive development of composition of classes.

1. Round and Not

Equipment: A number of each of the following: ping pong balls (white or painted various colors) corks, golf tees, stones painted various colors (some round, some flat), inner tubes, hula hoops, kick boards, rubber balls or any other objects which are flat or round.

Procedure: Toss all objects into the pool (omit the objects that sink for the non-swimmer). For beginner swimmers place objects that sink in the shallow end and for the swimmers place some in the deep end. Using one flat object and one round object show "round" and "flat". Upon signal direct children to gather as many flat objects as they can. Check for accuracy upon completion. Repeat but direct children to get round objects.

Concept: Have children explain why they felt all the objects they retrieved belong to the class called for. May be repeated for objects that a) float, b) sink, c) round and float, d) round and sink, e) a particular color, f) a particular color and shape, g) a particular color, shape and float or sink.

2. Red Rover, Red Rover

Equipment: None.

Procedure: All children line up at one edge of the pool. One person (or teacher) is designated as "it". "It" moves to center of playing area and calls out "Red Rover, Red Rover, let all the boys come over". All boys attempt to cross to the

other side without being tagged by "it". Those that are tagged help "it" next time. Repeat calling girls, or all children.

Concept: Point out that there is a group of 1) children, 2) girls and 3) boys. Ask children to identify to which group or groups a particular child would belong (i.e., Mary fits group #1 and #2). After beginning with the group "children" and subgroups of "boys" and "girls" add the element of color. Color is determined by bathing suit color. Call for boys/red or girls/blue or all children/yellow, etc.,. Again ask children to identify groups, subgroups and justify their responses (i.e., boys/red and boys/non-red and subgroup of boys and group of all children).

V. Egocentricity in Representation of Objects

Conceptual Problem:

A. Definition--The ability to imagine an object from the perspective of another person. This problem involves the limitations of egocentrism and concreteness.

B. Playground and gymnasium games and activities to enhance the cognitive development of egocentric object representation.

1. Part of the Whole

Equipment: A variety of playground equipment (i.e., bats, balls, jumpropes).

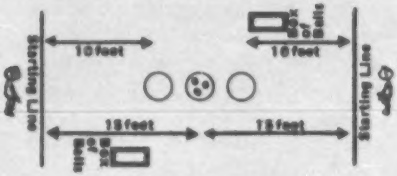
Procedure: The child closes his eyes and is given an object and allowed to touch only a part of the object. When he identifies the object he uses it to do an activity.

Concept: Child learns to determine "wholeness" by representation of missing parts. To increase the difficulty of the task the instructor can decrease the area of object touched.

2. Symbol Relay

Equipment: Balls of various sizes

Procedure: Place three different size balls (football, soccerball, softball) inside a two foot circle. Two children are fifteen feet from the balls, standing across from each other. A box of different size balls are placed ten feet from each child's starting line which is near a two-foot circle. The children must hop to their box and try to duplicate the exact pattern of balls in the center circle, then hop back to starting line. He can only take one ball at a time to his circle.



Concept: When child can complete this task, the instructor asks the children to play the same game but this time the children must put the balls in the same position. Each child must imagine the objects from the perspective of the other child.

C. Games and Activities which may be conducted in the swimming pool to enhance the cognitive development of egocentric object representation.

1. Will-o-the-Wisp (American Red Cross, p. 136)

Equipment: Blindfolds for each player and a bell or whistle.

Procedure: "This very interesting game is preferably played with six or eight swimmers. All are blindfolded except one person who is "it" and has a bell (or whistle). "It" submerges and swims under water. Each time he surfaces he must ring the bell and those blindfolded try to tag him. The player who tags the bellman becomes "it" and gets the bell. The tagged player joins the blindfolded group, and the game continues." The games can be simplified by shortening the boundaries of the playing area.

Concept: This game may be used to enhance child's awareness of his body in relation to another person by use of auditory rather than visual cues.

2. Obstacle Relay (American National Red Cross, 1969).

Equipment: Logs, barrels, poles, life buoys and/or other floatation devices

Procedure: "Teams line up at edge of pool. At a signal the first swimmer in each team races to a log anchored in the water, climbs over the log, turns and swims under it, and returns to start. Then the second swimmer follows suit, and the procedure is repeated in turn by the remaining team members. . ."

Concept: This activity should be helpful in enhancing the child's concept of such things as "over", "under", "behind", "in front of", etc. Task may be modified to suit the level of swimmers and progress in acquisition of concept. For example, initial stages of the game may be to "go-around" the object and come back. For non-swimmers this may be done in shallow water and for swimmers in the deep water. Additional obstacles may be added with different tasks at each (i.e., go around a log, go over an inner tube, go under a pole, come up in the middle of the ring buoy, etc.).

3. Mind Reader

Equipment: Stones partially painted or colored wooden blocks--many of each kind.

Procedure: One child sits "Indian" fashion on deck at the side of the pool with a number of stones in front of him. The

remainder of the stones are placed at the edge of the pool. Each child must select stones and place them in front of himself in such a way so they will look to him just as the "leader's" stones look to the leader. The child becomes a "mind reader" upon successful completion of the task.

Concept: The purpose of this activity is to provide the child with an opportunity to take the "other person's point of view" in relation to objects. Initially the procedure may simply be to 1) select the exact objects as the leader has, 2) order the same as the leader from left to right and then 3) be certain that objects are facing in the correct direction as well. Use only one or two objects in the beginning and increase the number of objects as the children seems to progress through this concept. Children may select necessary objects and then arrange them correctly on top of a kick board floating upon the water. Once completed they may "swim" the kick board to a designated finish line.

4. Jump

Equipment: Rope and/or hula hoops.

Procedure: From the pool deck have the child jump over the rope and into the water. Vary the height of the rope as well as its distance from the child. Place Hula Hoop in the water and direct the child to jump from the deck in front of hoop, behind it, into its center, to the right of it, etc. In deep water the children may dive rather than jump through the hoop.

Concept: These activities provide experiences for the child to further develop an internalized awareness of the relationship of his body and it's movements to objects in his environment.

5. Simon Says

Equipment: None.

Procdure: One child is "Simon" and faces the rest of the group. "Simon" selects any activity and says "Simon says to do this. . ." and shows the children. The children must then duplicate his movement.

Concept: Select activities involving only one side of the body, or one limb. The object of the game is for children not to "mirror", that activity but to perceive it from "Simon's point of view and duplicate it. They must perceive that for example, if "Simon" slaps the water with his right hand they cannot use their left, but must also use their right hand.

Two of the more traditional Piagetian conceptual problems can be

incorporated into all the gross-motor games. The first conceptual problem of this nature is Egocentricity in Social Relations which is related to the child's ability to take another person's point of view toward a physical display. At the preoperational subperiod, the child is capable of what physical educators have termed "parallel play". Piaget extends this by implying that the child is incapable of intercommunication with another child because he is unable to take the role of the other. The child is striving toward increased mobility of thought which will permit the child to shift rapidly back and forth between his own view point and that of another person. With increased mobility of thought (approximately seven years of age), the child begins to be interested in games with rules. In order to play such a game, one must be able to conceptualize the roles of the other players, and in fact, a child develops this interest at the same time that he begins to show in other ways his emancipation from egocentricity (Phillips, 1969). This concept finds its home in the very essence of structured games and activities. The instructor may further point or draw out from the child the roles and rules governing other players in the game.

The second conceptual problem which is incorporated in all grossmotor games consists of time, movement and velocity. These concepts are dependent on each other. For instance, when a child throws a ball at a target he begins to perceive the relationship between the ball, its size, speed, distance, weight of the ball and the accuracy of the throw. The instructor's role should be to point these relationships out to the child and begin to draw out explanations from the child as he progresses in his acquisition of these concepts.

Summary

Although many approaches have evolved using physical education activities to enhance intellectual development no attempt has been made to align these activities with a specific theory.

This paper demonstrated the application of physical education activities to Piagetian Theory. Specific conceptual problems which a child functioning within the Preoperational Period exhibits difficulty solving were listed and defined. Appropriate physical activities to assist in the solution of each conceptual problem were presented.

*This paper was designed to present a pratical application of Piagetian concepts based on the information presented in the previous paper: Winnick J.P., *Piaget-Based Early Developmental Experiences in Physical Recreation and Physical Education.*
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PIAGET, SELF-CONCEPT AND PHYSICAL EDUCATION

John F. Hayes

In developing the theme of this paper, I will first discuss self-concept, then delve into some tenets of Piaget's theory which seem relevant to us in physical education and which relate to self-concept.

In early childhood the youngster sees himself as the center of the universe. He is capable of seeing things only from his own viewpoint, and the world revolves around him and his desires. Gradually his understanding broadens, and he begins to see himself in a more realistic perspective. This self-concept includes both how the individual sees himself and how he feels that others see him. Closely related to, and greatly affecting these two aspects of self-concept is the way that others actually do see and act toward the individual.

Self-concept is a phenomenological approach, and has been given increasing attention by psychologists in recent years. Many, including this author, view self-concept as the most important single factor in determining human behavior

and performance. Bigge and Hunt (1962, p. 429) state that "Schools should do what they can to help children achieve adequate concepts of self. This may well be the most important of the recommendations we can make. To a large degree a person's achievement is limited to what he thinks he can achieve."

A book that should be "must" reading for educators and parents is Purkey's *Self-Concept and School Achievement* (1970). Purkey states (p. 10) "perhaps the single most important assumption of modern theories about the self is that the maintenance and enhancement of the perceived self is the motive behind all behavior."

While parts of the self-concept are in a constant state of flux, overall it is relatively stable, and fortunately so, as self-concept is the foundation of personality. Ausubel and Robinson (1969) point out that it is important for an individual to have a stable and favorable view of himself. In order to maintain this stable self-concept, a person will often distort or reject interpretations of reality that are in conflict with his own assessment of himself. This is recognized and explained by various psychological theories. Piaget would describe this as a failure to accommodate, with the individual distorting reality in order to assimilate it into his existing cognitive structure. We will return to this point shortly. Rogers (1951) states that experiences are either (a) organized into some relationship with the self, (b) ignored as being irrelevant to the self, or (c) denied or distorted because the experience is inconsistent with the structure of the self-concept. Freudian defense mechanisms are extensively used in this situation.

If it were not for this relative stability of self-concept, most of us would probably be failures in life. Most things worth accomplishing have some set-backs before the final goal is reached. If a single defeat changed the self-concept for that particular endeavor to "I can't", most of us would not accomplish very much. Conversely though, circumstances often dictate a higher concept of one's self than does exist. A boy or girl not accustomed to winning might attribute an unexpected victory to luck, and downgrade the role that their ability played, just as the individual who expected to win would use defense mechanisms to explain why he lost.

Purkey (1970) points out that success is hard to handle when a person has had many failures. Aronson and Carlsmith (1962) found that students who expected to do poorly were more contented when they did so than were those who had low expectations, but did well. Festinger's theory (1957) of cognitive dissonance seems relevant to this point. When results do not fit the individual's concept of himself, dissonance is produced. To keep dissonance at a minimum, the child will do whatever is necessary to have his behavior fit his self-concept and expectations thereof.

Beisser (1967) relates many instances of athletes who seem to have all of the physical ability to be champions, but just can't seem to win the big one. Sometimes, after finally winning a championship, these individuals self-deprecate themselves as lucky, unworthy of victory over the champ, and so on. Only after a period of time do they adjust to being a champion. Certainly, the individual who does not see himself as being capable of winning a championship has very little chance of winning it. If he should win, this success does not fit his self-concept, and some adjustment must be made, either of his self-concept or of

the data in question. The teacher or coach must be ready to reinforce the proper adjustment, which is toward a more positive concept of himself.

Having an individual feel that he is actually better than his performance indicates does have some obvious advantages. If a person is not yet performing at the level he is capable of reaching, to accept defeat would certainly be harmful. One of the real problems in teaching and coaching is to prevent collapse of the self-concept after repeated failures.

Bandura (1969) has made the observation that a low self-concept often has a good reason for existance. If a person has achieved poorly over a period of time, he is cognizant of his performance, and his self-concept suffers accordingly. Regardless of our success in improving a person's self-concept, that new image will not survive in the face of non-confirming experiences.

It doesn't do much good to convince an individual that he is a great sprinter, only to have him finish last in the race. Unless a person has some psychological problems, his self-concept will be fairly well based on reality. There will be some "bright spots" and some "not-so-bright spots." These bright spots come about through success. Many students may have academic problems, but achieve some measure of success in physical education. For these children it is especially important that we provide some positive school experiences.

There are many facets to the self-concept. Some of these facets may be very important to an individual's concept of himself, while others are peripheral and relatively unimportant. As a common example, boys may often see their athletic prowess as extremely important, with academic ability as a relatively unimportant factor. Teen-age girls often see femininity as a more important element of the self than athletic ability (Coleman, 1961). We must be very careful, however, not to assume that something is important or unimportant because of what an individual might say. "I don't care" is a primary technique of ego protection, often used when the individual may care a great deal. Freudian rationalization may well be present.

Self-concept has often been referred to as the "self-fufilling prophecy." If a person sees himslef as being capable of doing something, he has a good chance of accomplishing that task. Successful coaches always seem to have a knack of building confidence in their players. Confidence is nothing more than a positive self-concept of one's abilities in a given situation. When an individual is successful in something that is important to him, the success seems to affect not only that particular aspect of self-image, but other areas as well.

Glasser (1969) makes a strong plea for doing away with scholastic eligibility requirements in extra-curricular activities. The child who is not doing well academically may profit greatly from success in athletics, debate or the school play. This success has been found to have a positive effect upon the individual's self-concept as a student. If we take away the only opportunities that an individual has for success, and leave him with only the areas in which he is experiencing failure, the result to the self-concept is obvious. There is no way to go but down.

Some of the best examples of psychological limitations can be found in track. For years the top milers were running within split seconds of four minutes, but always with the belief that a four minute mile was physically impossible. When

Roger Bannister finally broke the four minute barrier, many runners soon followed suit and accomplished something they had previously believed was impossible. The self-concept is much like this four-minute barrier in track. When an individual believes that there is a limitation, be it mental, physical or whatever, he will not exceed this limitation.

With the significance of the self-concept hopefully established, let us move on to Piaget and to some of the implications that his work has for physical education and self-concept. Piaget has not, at least to my knowledge, dealt directly with self-concept. However, his work does have many implications for those of us who are concerned with this aspect of development. Some of these areas are developmental level, stages of learning, transductive thinking, language acquisition and adaptation. I am sure that there are other areas of his work that we could apply, but I will confine myself to the above.

Self-concept is both affective and cognitive. It involves how we feel about ourselves and what we know, or assume to know, about ourselves, our abilities and our shortcomings. While Piaget has not devoted much time to affect, he readily acknowledges the importance of the affective domain. "Affective life, like intellectual life, is a continual adaptation, and the two are not only parallel but interdependent, since feelings express the interest and value given to actions of which intelligence provides the structure" (Inhelder & Piaget, 1958, pp. 347 - 348).

Perhaps one of the more obvious aspects of Piaget's work for self-concept is in the area of language acquisition. Ginsburg and Opper (1969, p. 90), in discussing Piaget and language, state that:

> ". . .in his initial experience with language, the thing (or action) and the word for it are simultaneously present, and the two are seen as a whole. The word is in a sense part of the thing, and vice versa. It takes a long time for the child to fully disassociate the word from its referrent; he must learn that the word bears a totally arbitrary relation to that which it refers to and is not a part of it. Even in the period under discussion (four to seven years), the child has not fully grasped the relation between word and thing."

A child may be eleven or twelve years of age before he is able to fully separate the word and the action. If this is the case, then being called a "dummy" in fact makes one a "dummy". This helps to explain why younger children are so upset when someone calls them a name. The implications of this factor in language acquisition are apparent. In dealing with younger children, we must be extremely careful in our choice of words. When a child fails to perform properly, the statement that "I guess you're not strong enough (or whatever) to do that stunt" can have serious effects on the self-concept. Conversely though, telling a child that he is "good" makes him "good." We are quite likely to get the kinds of performance that we expect from a child if the child knows what our expectations are, and if he feels that it is within his capabilities.

Transductive reasoning is another idiosyncrasy of early stages of development that may have a bearing on self-concept. Piaget (1951) defines transductive thinking as a preoperational method in which the child goes from particular to particular. Flavell (1963, p. 160) comments: "Centering on one salient element

of an event, the child proceeds irreversibly to draw as conclusion from it some other, perceptually compelling happening." Our 8 year old demonstrated this type of thinking for us recently. We were discussing how dark it was when we got up in the morning. When I told her that each week the day got ten minutes longer, she thought a moment, then replied, "In six weeks the day will be twenty-five hours long." This type of reasoning could easily lead to "I can do this, so I can do that," or conversely to "I can't do this, therefore I can't do that either." At this stage a child cannot rely on reasoning to the extent that an adult does, but must trust his perception to reach a conclusion. A child can only see that he has failed, whereas an adult is able to reason through the cause of his failure and try again. If this possibility exists, it is very important that we set up our curriculum so that the child can experience success, and avoid as much as possible, situations in which the child has a likelihood of failure.

Two somewhat related factors that must be considered when teaching physical education activities are cognitive developmental level and the stage of learning for the skill in question. While these two points do have similarities, they are different in important ways. Egocentricity is a factor in cognitive development. Piaget comments (1969, p. 13) ". . .the child's initial universe is entirely centered on his own body and action in an egocentrism as total as it is unconscious. . ." Egocentrism is evident in stages of play, with the young child progressing from solitary play through parallel play, low organized games and eventually into team sports. This is a cognitive decentering, in which the child is gradually able to handle more and more interactions with others. He decenters his thinking from consideration of his viewpoint only to one in which he can take into account many different factors. It would be very destructive to a child's self-concept for a teacher to try to teach, or worse yet to critize errors, at a stage the child is not yet capable of comprehending. An example might be in Little League baseball. We often see coaches and parents berating a child for not making the double play, when there just is no way that the individual could take into consideration the runners on first and second, the batter and the ball, his teammate moving to second, and so on. The child can handle one element in relation to one other element, but not in relation to a combination of other elements. For instance, he can handle the ball in relation to his glove, then in relation to his teammate covering second, and so on. He cannot handle the ball, the baserunner and his teammate all at once. He may come up with the right play intuitively, but not deductively until he reaches a cognitive age of perhaps fourteen. We must be ready to help the individual into the next stage when he is ready to move forward, but just as pushing him into physical feats for which he is not mature enough will destroy self-confidence, so pushing him in cognitive areas with which he cannot yet cope with have the same harmful effect.

Piaget identifies three levels of thought. First is the sensori-motor or plane of action thought level. At this level the individual is assimilating the motor skill at the concrete level. The second level is one of cognitive association, or a plane of thought about an action. The individual can describe and can think through the physical skill. At the third stage, that of abstraction, the individual is able to interpret and act out abstract thought. A "game plan" can be understood, and the individual can improvise in a busted play situation. This third stage is one

that we should not expect the individual to reach before the age of deductive reasoning thought. Before that stage if we want a particular reaction, we must drill that situation for a habit response.

Just as a young child is not able to think about other things when he is tying his shoe, the student who is learning a motor skill at the first level must devote his entire attention to that particular skill (Oxendine's fixation stage). If we as teachers step in and attempt to teach or to criticize the individual at this level for anything other than the skill itself, the individual's confidence will be shaken. We've all seen many examples of a basketball player busily dribbling the ball down the court, quite oblivious of a teammate open under the basket. If the dribbler is operating at the abstract level with this skill, a "gentle" word from the coach regarding the merits of team play may be in order. However, if the player is operating at stage one, all concentration must be on the skill itself. Talking to him about passing to the open man will only cause him to divert attention from the skill, causing him to fail. We have everything to lose and nothing to gain when we criticize the individual who is functioning at level one thought for not passing the ball.

In our teaching we must recognize the three levels of thought, and help the individual to gain confidence in himself at each level. In accomplishing this, we must implement all three areas as part of our practice sessions. Again, it is important to differentiate concentration and stages of learning. An individual may be at the point where he can cognitively handle team interactions, and yet be at stage one of skill learning, where all attention must go into the skill. Or he may be at stage three of skill learning, where he can think abstractly about the skill, and yet not be cognitively at a point where he can handle the complex interactions necessary, for instance, in moving without the ball in basketball.

Piaget's functional invariant of adaptation with its two components, assimilation and accommodation, has implications for self-concept. Cognitively, assimilation is the process of making additions to pre-existing schemas, or of reorganizing information into existing structures to adjust to new conditions or new information. Accommodation is the process of changing the existing structure to fit new input.

We might consider Archie Bunker as an assimilator. If Archie heard that a black outscored the whites on an examination, he would not accommodate, or change his schema of blacks as inferior, but would distort the facts to fit his existing mental schema on blacks. He might conclude that the black cheated on the exam, or that the questions were not fair. Edith (Dingbat), on the other hand, accommodates, or changes, her existing schemas to fit everything she is told.

More realistically, assimilation and accommodation are complimentary processes, occuring simultaneously. We both assimilate and accommodate as new information is fed into the existing schemas. An extremely important point that Piaget makes is that we can adapt to new input only if there is a pre-existing schematic structure capable of handling the information in question. For instance, if a person were to sit in on an advanced chemistry lecture with no prior exposure to chemistry, he would get very little from the lecture. It is not a question of intelligence, but simply of not having any pre-existing schemas to

which the lecture can be adapted. Another example would be listening to a lecture in a foreign language. Without a prior knowledge of the language, we cannot adapt to the content.

Archie Bunker also illustrates for us the importance of the affective domain in structuring the cognitive domain. Archie does not accommodate his existing cognitive structures to fit the new input because of emotional feelings about blacks. Too often, we cannot change our self-concept, or accommodate to new input, because of affect. If we do not "feel good" about ourselves, success does not fit our cognitive schemas. We are apt to attribute our success to something other than our abilities.

Let's look at two examples of how an event might or might not be adapted to our cognitive structure. If I were sent up to bat against a major league pitcher and hit the first pitch over the fence, I would attribute this feat to "dumb luck" (especially since my eyes probably would have been closed when I swung). There is nothing in my concept of myself which accommodates to this new input. I do not see myself as a hitter. I don't "feel good" about myself as a baseball player. But suppose now that you have a young minor league player who is a good hitter, and has a great deal of confidence in himself. Given that same situation of hitting the first pitch over the fence, his reaction will be very different from mine. He will probably feel that "Hey, I can hit these guys just like I hit those minor leaguers." And if we both come to bat again, I don't have to tell you which one is more likely to hit another one over the fence, even assuming that physical potentials are equal.

In our teaching and coaching, we must take into consideration not only the physical potential of the individual, but the self-concept as well. If an individual has great physical potential and has a good self concept, a few failures before he achieves success are not apt to change his beliefs about himself. Failure is foreign to his mental schema, and he will reject it. Given that same physical ability, however, in a person with a poor self-concept, the teaching situation is very different. Failure would be assimilated into, and strengthen, the pre-existing schema of failure. Success does not fit into the schema, and cannot be accommodated. This second individual must be put into situations where he can experience a series of successes, even though each may be a very small step. When dealing with self-concept, there are no small victories. Every success is an important one.

If we were teaching math, most of us could probably agree that you start with the simple things and build toward the complex. If we were to start with the complex, most students would give up after experiencing repeated failures. We would be violating Piaget's theory that we can adapt only to that for which pre-existing schemas have been developed which are capable of both assimilating the new information and accommodating to it.

If we can assume that the cognitive aspects of self-concept are developed in a similar fashion, we can recognize that self-concept should also be built on a progressive basis. Each child must be able to experience successes which help him to develop a cognitive structure to which he can both accommodate and assimilate future successes.

Let's go back briefly to a few statements made earlier. Purkey (1970) pointed

out that success is hard to handle when a person has had many failures. Might it be that the existing schemas relating to abilities of the individual are all negative and the adaptation to the new information simply is not possible?

Beisser (1967) pointed out the difficulty that many people have in adjusting to championship roles, and of consistently playing like champions after they do reach the top. Certainly, there are many complex factors in this situation. It seems to me though, that one real message here for us as educators is that we must build schemas of success in our students. We must make sure that the framework is there to accommodate and assimilate to success. If we are to do this, we must make sure that each student is able to achieve success consistently enough that this success fits into the existing schemas. We must build confidence in our students to the extent that they expect to succeed. Both assimilation and accommodation are necessary. The success must approximate expectations and beliefs about the self closely enough that it can be assimilated. At the same time, accommodation takes place in that the schema is changed to include these new achievements.

In our constant striving for championships in the coaching aspect of our profession, we may set goals that are unrealistic for some of our students. In physical education classes we must set our standards, not for varsity competition, but for the individual student. If our goals are too high, we relegate many students to failure. If a student is performing at his full potential, we should consider that performance as successful, and that success could help to start building toward other successes. What is most important is not that we turn out a champion golfer or tennis player, but that we teach the skills well enough that the student learns to enjoy them and desires to participate in them, both for fun and for health, throughout his lifetime. We too often consider winning as success and losing as failure. What is a good performance? Is it par golf? Or is it 120 with a lot of exercise and a lot of relaxation? I am not suggesting that we settle for mediocrity. What I am suggesting is that we set standards for success that are within the grasp of the individual. For the good athlete, lets talk about par, and let him equate success with par. But, for the average student, and most of us know that the average person does not shoot par golf, let's set standards that allow for success within the abilities of that individual. Our attitudes must be such that we can recognize the small steps as successes, and use them to help each individual build a new mental schema of himself as someone who is capable and successful, as someone who "feels good" about himself. Again, dealing with self-concept, there are no small victories.

In working with children in physical education, we should be able to find something in which most children can be proficient. For instance, if we examine the components of fitness: strength, power, speed, endurance, agility, flexibility, and so on, most children should have some area in which they can succeed. Perhaps it will take some imagination on the part of the teacher, and some children may excel at nothing greater than being a good helper with equipment after class. More important than skills, though, is the child's knowledge that he is liked and accepted. Despite lacking in skills, most individuals can still have pretty good self-concepts if they are liked and accepted by others. Maslow's hierarchy of needs points out the importance of being accepted by others.

In summarizing, it seems that the one message that comes through over and over is that we must build ladders of success for our students. Curriculum must be geared to individual abilities so that each individual can experience success.

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ON THE APPLICABILITY OF PIAGETIAN THEORY TO MOTOR AND AFFECTIVE DYSFUNCTION

George D. Patrick

INTRODUCTION

Therapeutic intervention has been known for its lack of methodological and theoretical uniformity. Piagetian theory has received considerable currency in developmental psychology, early childhood education and, more recently, therapeutic intervention. The application of Piaget's theory and methodology provides a chance for consistency between theory and practice, but its acceptance brings considerable controversy. It is the thesis of this paper that, while much of Piaget's methodology is applicable to programming for atypical populations, especially exceptional children, application of his theory is highly problematic.

Four sections of this paper are to be undertaken: (1) relevant aspects of Piaget's theory are examined, (2) the application of this theory in the practice of therapeutic intervention is reviewed, (3) Piaget's methodology and its therapeutic applicability is discussed and (4) situations from therapeutic settings are used to summarize the applicability of Piaget's works to motor and affective dysfunction.

PIAGETIAN THEORY

Jean Piaget refers to himself as a genetic epistemologist. He is first a philosopher of intelligence and only methodologically a developmental child psychologist. As an epistemologist Piaget is concerned not only with the nature of knowledge, but especially with the structures of the mind and the processes by which knowledge is acquired. He is unique as a philosopher for his examination of the growth and development process. His is no armchair philosopher.

Piaget has placed his theory in relation to the modern period of philosophy by reviewing DesCartes, a rationalist. Locke, Berkely, and Hume, empiricists, and Kant, who made an heroic attempt to synthesize those two disperate philosophical positions.

As I see it, modern philosophers have abandoned many of their traditional concerns to focus upon the problems of knowledge. A radical, but significant, philsophical position, linguistic analysis, suggests that with increasing sophistication in empirical science, the only philosophical problems remaining are the policing of language (Linsky, 1952; Austin, 1965). Piaget, too, is primarily concerned with the problems of knowledge, but he views developmental psychology as an empirical resource for the generation of epistemological theory.

Piaget's theory has achieved in a somewhat scientific manner the synthesis that Kant was seeking. The synthesis must explain the subject-object (self-world) relationships and must answer the concerns of DesCartes' thesis of innate knowledge and Locke's antithetic "blank slate" view of the mind.

As a self-proclaimed epistemologist it is only fair to ask Piaget what it is that a human being inherits as far as his intellectual future is concerned. He writes:

> It is obvious, in the first place, that certain hereditary factors condition intellectual development. But that can be interpreted in two ways so different in their biological meaning that confusing one with the other is probably what has obfuscated the classic controversy over innate ideas and epistemological *a priorism* (1952, p. 1).

Piaget's position is neither hereditarian nor environmentalistic; it is both. It is interactionistic. He has presented a picture of development as a process of changes in the structure of behavior and of thought that originate from the infant or child interacting with his circumstances. He holds that a newborn infant comes equipped not with a store of ideas and concepts but with a "functional nucleus of the intellectual organization (1952, p. 3)" which will orient the perception of the world structures to the mind and mediate its contact with reality. This function begins, presumably, as naturally as breathing. It grows by functioning and develops levels of increasing sophistication through maturity.

The simplicity of Piaget's theory is almost overwhelming: a neonate moving his arms and legs is already engaged in a process inexorably leading to the most profound mental processes if only he continues to "deal with" his environment. He gradually accumulates increasingly elaborate schemas, combining them, using them to correct his perceptions, using them to restructure the incoming data.

Crucial to this paper is the *dynamics of motivation*. Piaget holds that every human being has a continuing and powerful need to act and to know. Motivation and cognition are inextricably combined in their own dynamic. The possession of a structure requires the exercising of it. Yet, in the process of exercising it, further schemas are developed. Extrinsic motivators are not required. Cognitive structures are self-motivating.

The causal basis for epigenetic changes in behavior and thought are the processes Piaget calls accommodation, assimilation, and lack of equilibrium between the infant's behavioral repertoire and circumstances encountered.

While accommodation and assimilation are important concepts Piaget's process of equilibration is a concept which holds greatest concern for therapeutic intervenors. According to Piaget the human organism *never* achieves equilibrium; it seeks stimulation; it tends to do that which it can. Thus each internalized cognitive structure involves affective self-regulation, its own motivational dynamic. From within the individual, this regulation is termed interest, effort, selection, drive, etc.; viewed from the outside, this affective regulation is based on the perceived value of the objects concerned and of the solution sought. Even from the objective viewpoint, cognitive structures are seen by Piaget as self-motivating.

Piaget's observations of early childhood development have allowed him to draw important theoretical hypotheses not only from conceptualizations of behavioral development, but also from conceptualizations of intelleigence and motivation. Hunt (1969) notes that Piaget's observations and theories ". . .provide definitive answers to few questions. Rather they serve to open doors and to make issues for investigation."

APPLICABILITY OF PIAGETIAN THEORY

Piaget's theory must now be placed along side current theories and, perhaps more importantly, problems in the area of motor and affective dysfunction. In this way we can observe structural-conceptual fit or misfit, styles of remediation, and problems dealt with or overlooked by the application of Piagetian genetic epistemology.

In 1969 J. McVicker Hunt undertook the task of comparing Piagetian theory with some major theoretical postures in psychology. He compared Piaget with Gesell, S-R Behaviorists, Gestalt Psychology, Psychoanalysis and Drive Theory. A careful reading of Hunt gives some general insights into the limitations of Piagetian theory upon which it seems appropriate to comment in this paper.

Piaget describes an epigenetic system of changes in the structure of behavior as essentially pre-determined, altered by sensori-motor interaction between the infant or child and his environment. Those involved with the change of behavior are condemned to very real limitations based upon individual maturity and "readiness". Piaget and learning theorists take issue over the concepts of readiness and motivation which appear to be critical concerns of therapeutic intervention. Learning theorists are concerned with operant conditions which enjoin the individual to action. According to Skinner and to behavior theorists generally, the modifications in behavior that constitute shaping occur because of rewarding events that follow this occurrence. They view the individual as

basically passive and inactive. They search for extrinsic reinforcing consequences of desired behavioral modifications. . .usually attributed to events which directly follow that modification. Piaget, on the other hand, calls into question extrinsic modifiers of behavior. While he is most concerned with matters cognitive and epistemological, he deals with this subject in his notion of "lack of equilibrium". Piaget's obeservations suggest strongly that changes in behavior (and in cognitive structures) come at the time when the learner encounters circumstances which will not permit him to proceed as anticipated. These circumstance upset the child's equilibrium and force him into accommodations. Piaget views the child as active in the seeking out of dissonance (Festinger, 1957). The child is seen as seeking stimulation through novel situations. In the language of Piaget, reinforcement would consist not of achieving equilibrium, but in exercising existing structures to the point where they achieve the child's anticipated goals and would assimilate a modification in the behavioral structure as a result of encounter with novel circumstances not beyond the child's adaptive limits. In the therapeutic setting when there is gross disperity between the kind of function needed to exist in society and the deviant or retarded functioning of a particular individual, we need to deal actively with such categories as readiness, motivation, and styles of learning. The theoretical difference between Piaget and learning theorists poses this question: "Are we working from a repairman model or a healer model?" Bakan (1966) points up this distinction:

> The healer assumes that the forces for healing are already inherent in the sufferer, and these forces are to be released. In contrast, to the repairman, the healer does not attempt to supply efficient cause, he only permits the existing forces to operate (p. 98).

The issue of intervention style is thrust open upon us when confronted by these two theories. As a therapist, I am concerned with the aspect of Piagetian theory which prohibits the repairman approach in therapy. For, if we take Piaget seriously, it means that we must not see therapy as providing efficient cause, but instead as enabling exisiting forces within the individual to operate. Although every effort is made on my part as a therapist to involve the child in the planning of his own therapy, I feel restricted in my effort to provide therapy under this limitation imposed by a Piagetian view. In assessing developmental functioning in gross or perceptual-motor areas, social-emotional functioning in recreational settings, play behavior, and the like, I look for indications of what would provide the most efficacious remediation program. I search for likely styles of learning (in hopes of providing efficient cause) and the kinds of reinforcing events to maximize the effect of therapy. I do this not because I am a radical behaviorist, nor because I lack respect for Piaget. I do it because I have a child in front of me who is different enough to require special therapy.

Is Piaget being insensitive to the therapeutic needs of special populations? No, not from his point of view. Easley (1972) points out that ". . .Piaget himself has shown little interest in individual differences in intellectual ability or in differences in rates of progress through the stages of intellectual development". Piaget is not primarily a developmental psychologist; he is as stated before, a genetic epistemologist. Piaget did not set out to study cognitive development of individuals much less developmentally different individuals but rather the

development of cognition. He is not being intentionally insensitive to individual differences and deviances. Yet, the fact remains that the genetic theory of evolution from which Piaget operates generally disregards variability within the species.[1] Maier (1969) points out that "It is up to us to sort Piaget's concepts for their relevance to research, teaching, and therapeutic intervention with individual human being (p. 90)".

The question of developing creatively in children is strongly related to the concerns of Piaget. Bishop (1971) stresses intensive logitudinal training as needed to attain creativity. The recent study by Reynolds (1973) indicated that creative responding could be brought under immediate operant control. While short term training did not transfer to other circumstances, repeated training did produce differences in creative responding. Reynolds (1973) states:

> . . .it is apparent that the provision of interesting materials, continuous attention, and random praise are not sufficient to foster the highest levels of creative responding in children. To insure the emission of desired creative behavioral responses, reinforcement in the form of verbal approval of desired attributes of creativity must be made in an immediate and meaningful fashion (p. 83).

Thus, conflict arises with Piagetian theorists who ascribe creativity to the circumstances when children have maximum manipulatory impact upon their environment as the similarities Elkind (1967) and Kohlberg (1968) point out between Piaget and Montessori.

The areas in which Piagetian theory seem to have limited applicability for therapeutic intervention are found in the concepts of readiness and its encouragement, the style of intervention, and the problem of developing creative responses.

PIAGET'S METHODOLOGY AND ITS APPLICABILITY

In general, Piaget's methodology has four attractive aspects for those involved in making therapeutic interventions: (1) a client-centered approach; (2) a non-judgmental semi-clinical interview; (3) child responses viewed as non-defective; and (4) action as the initial mode for knowing.

The *client-centered approach* is basic to Piaget's method for working with children. In reading Piaget, one senses his ability to get into the heads of children unmatched by other authors in developmental psychology. Piaget's approach is to work with children as individuals one at a time rather than as a class or group of individuals assumed to have similarities. His intent was to develop epistemological generalizations from individual instances, an inductive approach. Piaget tried to see the species in general from the individual in particular. Nevertheless, he fully respected the individual and his style of thinking and behaving.

The application of Piaget's client-centered approach gives credence to the non-categorical approach (Linford, 1971) to remediation; that is, labels such as "mentally retarded," "brain damaged," "emotionally disturbed," "cerebral palsied," and the like are not useful in the planning for and actuating of programs gauged to increase levels of adaptive functioning. It encourages a one-to-one approach to therapy, at least for diagnostic purposes. While the

child-centered approach is not unique to Piaget, it is a principle often accepted in words and most frequently breached in the day-to-day operation of treatment facilities and public schools. The concerns of the child (or client) rarely come first in daily considerations of staff scheduling, administrative policy, and day-to-day routine. To accept this aspect of Piaget's methodology is a revolutionary, status quo upsetting posture in today's child caring institutions.

The semi-clinical interview used by Piaget is gauged to find how the child is functioning, to inquire and check the personal cognitive structures which exist at that particular moment. Piaget methodically focuses upon the thought processes of the child concerning an issue, but he artfully manages to remain non-directive. The atmosphere created by Piaget comes through his reported interviews; it is an atmosphere of a concerned adult accepting a child's responses as valid for this moment. In later childhood, Piaget often asks for evidence of their explanations or suggests tentative alternatives, still the approach to the child is non-judgmental.

Many therapists would be comfortable with this aspect of Piaget's methodology. His non-directive open discussion about an issue is not unlike Rogerian dialogue or the play therapy guidelines of Axline. Piagetian theory is entirely immersed in an attempt to comprehend children's cognitive schema; nevertheless, he faithfully pursues the direction taken by the child. His theorizing takes place *after* the data is recorded.

The semi-clinical interview gives birth to what might be Piaget's most significant legacy to the art of therapeutic intervention: *non-defectivity of child response.* Piaget insists that there are no "wrong" or defective child responses. If we remember that no human learner approaches anything in this environment as a blank slate or empty computer program, then we are enjoined to determine what potential underlies the entry behavior. Easley (1972) states:

> We don't realize that children may be pre-adapted to think about their environment in particular ways, and that many of these ways, while different from, and even logically inconsistent with certain scientific conceptions, nevertheless have great potential for developing into currently acceptable scientific or other rational ways of thinking.

From Piaget's point of view, we fail to respect the child's authenticity when we conduct a skills analysis from an adult viewpoint. We view the child, in Easley's words, "through the big end of the telescope": from the teacher-made terminal objectives. Page after page, Piaget tells us by precept that children's responses are non-defective. Our job as therapist-educators is to free kids to think the best way they can. Understanding can be encouraged and fostered, but it is an autonomous development, according to Piaget. Those of us who have been trained in analysis of human movement have to unlearn error correction as our primary means for obtaining greater skill proficiency and substitute a more positive approach perhaps as radical as that suggested by Seidentop (1972).

The similarity of Piaget's principle of non-defective response to other therapeutic approaches is striking. The existential psychoanalytic approach uses this technique to respect the client's integrity and the validity of his "her and now" mode of being. The affinity to Rogers and Axline has been previously

mentioned. Harris (1969) would label this kind of responding to children as an "I'm OK, you're OK" transaction.

When Piaget's works are taken as a whole, the most revolutionary principle is seen to be that *knowledge develops from action.* Action is the initial mode for cognition. More advanced understandings grow out of simpler ones, but they always originate in action settings and develop through actions. The methodology implied by this principle transcends a simplistic emphasis in the sensori-motor phase, in spite of the fact that Piaget devoted more detailed analysis to the sensori-motor phase than any subsequent period. Regardless of the developmental stage, every new dimension is first experienced by its physical realities. Epigenetic development proceeds in identical sequence from the physical to the psychological, from concrete to abstract, and from experience with the object world, to the social world, and to the ideational world. In spite of the fact that this development ends in formal operations and the acquisition of propositional knowledge, Piaget states that ". . .it consists in a gradual construction of organs obeying the same functional laws (1952, p. 359)". Piaget gives us no rationale for a hierarchy of kinds of knowledge of ways of knowing even though he indicates in what order styles of knowing are developed. It is erroneous for us to infer that sensori-motor information processing is of less worth than an abstract logical operation just because the latter come later in human cognitive development.

Those of us who work in mental health settings are well aware of the primacy of action. Physical exertion and sensual experiencing have a powerful directness. Physical involvement begets psychological involvement.[2] The child placed on an appropriately challenging but possible task, say, a four-inch wide balance beam, is able to derive considerably more benefit from that than from a demonstration, lecture, or group discussion on balance beam walking. Not only is the benefit in improved physical skills, but concomitantly we see psychological benefits.

My experience in a residential treatment center over the past six years has verified the principles that knowledge develops from action. The general program objectives developed by the activity therapy team at Herman M. Adler Center for Children are:

1. Basic physical skill competence.
2. Learning how to learn physical skills.
3. Learning to cope with new experiences in physical activity, sports and games.
4. Assessment and understanding of performance (Patrick, 1971).

These program objectives were interpreted specifically for each child in residence and negotiated with the child in terms of his own personal goals at a level which he could comprehend. These goals are heavily weighted toward gross motor concerns. They avoid the "learn that" or "learn about" in order to stress "learn to" and "learn by doing". They are consonant with the principle that knowledge develops from action.

It must be carefully stated that these activities were not done to increase academic skills such as reading. To suggest this outcome is unfounded by research (Ismail and Gruber, 1967). Instead we aimed to help the child build his own organization of systematic knowledge based on the foundation of physical

interaction with his environment. It was expected that the child whose motor responses were improved to the point where he was experiencing facility in building up such a systematic body of information would show general improvement in learning as indicated by achievement measures and even in terms of intelligence tests (which are an imperfect form of achievement measures). Our experience confirms that we do move to learn as we learn to move.

SUMMARY THROUGH EXAMPLES

1. *Autism*

Piaget's genetic epistemology required him to study the affective-perceptual system selective attending begins early in life. Selectivity reveals interest, a focalization of affect. As William James expressed it:

> Millions of items of outward order are present to my senses which never properly enter into my experience. Why? Because they have no *interest* for me. *My experience is what I agree to attend to.* Only those items which I notice shape my mind--without selective interest experience is an utter chaos. (1890, p. 402).

When disturbances occur in attending in an extreme form of withdrawal from reality, it is called autism. Piaget (1954) suggests that there is a stage of infant development during which the child cannot distinguish from himself and his experiences. From this autistic stage, the infant comes to distinguish between "I" and the "not-I".

The development of awareness of self is crucial for outgrowing complete autism. Piaget (1930) wrote:

> In order to be objective, one must be conscious of one's "I". Objective knowledge can only be conceived in relation to subjective, and a mind that was ignorant of itself inevitably tended to put into things its own pre-notions and prejudices, whether in the domain of reasoning, of immediate judgment, or even of perception. An objective intelligence in no way escaptes from this law, but being conscious of its own "I", will be able to say what, roughly, is fact and what is interpretation (1930, pp. 241-2).

Writing more directly about autism, Piaget said:

> From the ontological viewpoint, what corresponds to this manner of thinking (autism) is primitive *psychological causality*, probably in a form that implies *magic* proper: the belief that any desire whatsoever can influence objects, the belief in the obedience of external things. Magic and autism are therefore two different sides of one and the same phenomenon--that confusion between the self and the world which destroys both logical truth and objective existence (pp. 302-303).

While Piaget studied, thought and wrote about childhood autism, he did not make direct suggestions for correcting this dysfunction. In fairness to Piaget, however, he was describing autism as a normal stage of early development. Still, it is a basic limitation of Piaget's theory of genetic epistemology that it does not suggest practical approaches for assisting the child through developmental stages. We should expect his theory to generate experimental hypotheses. We should be

able to predict, observe and match the developmental stages as the child becomes more aware of his own self, his actions and discriminates events caused by his actions from those caused by, say, the therapist's actions.

Our attempts at this goal through activity therapy have been encouraged (Costonis, 1974a, 1974b). The movement therapy approach taken can hardly be described as being implied or otherwise derived from Piaget. What is implied, however, is that we first establish a consciousness in the autistic child of his own selfhood and, second, establish the world of "not-I." What we gained from Piaget was the concept that autism is a normal stage of early childhood, that our task was to help the child mired in this state of development to give up perceiving autistically in favor of more veridical percepts. We wanted to change the attractiveness of autistic stimuli–the child's stereotypic behaviors. To do this we imitated these behaviors, made dances incorporating them, did them in different positions in space and with differing magnitudes, teaching the child to *do* the stereotypic behavior at will and in concert with the movement therapist. We effected a change in the quantity, quality and intensity of the child's behavior. It is believed that this diversification and controlled use of the stereotypic behaviors was successful in ameliorating autistic perception (and we know that it decreased the stereotypic behaviors) in that the ground upon which the percept occurred had become more general thus wearing off its gratification qualities.

In the use of swimming activities with autistic and inattentive profoundly retarded children we have had occasion to teach an orienting response. In several children between the ages of four and ten, we have observed a lack of child response to being submerged in water and released. These children made no effort to reach for the activity therapist or to "climb" to the surface. This submersion took place after pool orientation sessions and some familiarity with instructor and routine was established. We dealt with this lack of response by progressively taking the child to a state of oxygen insufficiency (no easy task for people who are trying to develop positive relationships with these children). Through repeated trials we were able to help the child learn to recognize his system's incompatibility with a oxygen-less environment: a healthy respect for the water. These children all learned to reach for the instructor who would then rescue them from the underwater position. The method may seem extreme, but it worked. We were able to get orienting or survival-type responses from these otherwise disaffected children. These children made satisfactory adjustments to the water and were able to gain the rudiments of water safety within their period of residence, usually between four to eight months.

These examples of affective-perceptual disorders can be extended to behavioral disorders in more mature, less severely involved patients. Therapy for emotionally disturbed children is not found in Piagetian theory. As practitioners we know so little. As Solley (1966) states, "The questions remain how affect and perception are interrelated, what are the precise developmental sequences and how affect-control behavior develops. The area is ripe for research and the future eagerly awaits the answer (p. 302)".

2. *Gross motor dysfunction*

Piaget expended the greatest amount of effort in the explication of the initial

sensori-motor period. This should be of particular interest to activity therapists who work with children in therapeutic settings and physical education specialists working with exceptional children in the public schools. My experience (Patrick, 1974) has been that the incidence of children needing gross motor remediation runs between 5-14% in the public elementary schools and between 30-50% for children in residential treatment for behavioral disorders and nearly 80% of the severely developmentally disabled need similar remediation. From normative scales of growth and motor development, it is possible to assess the level of gross motor functioning of a particular child. If he is significantly behind the norms for his age, some remedial program is usually indicated. The problem of the activity therapist or physical educator is to find appropriate "developmental" activities--that is, activities which are at a sufficiently challenging level that do not overwhelm the child. Hunt (1969) called this the problem of the match. Certainly this principle finds acceptance in every theory concerning human learning.

Of the children identified as significantly behind in their motor development, many, if not most, will deviate even further from the norm with each passing year given their previous environment and their own inadequate gross motor learning style. When there is disorder in neurological organization so that what is apprehended of reality for a young child inhibits development toward more accurate apprehension of his world, intervention is indicated. Though we cannot see inside his cognitive structures to ascertain the effect of gross motor therapy, we must intervene with experiences which have some chance of helping the child's perception of reality become more veridical.

What concerns me about Piaget, or at least Elkind's (1968) interpretation of Piaget' is that while it is deemed possible to accelerate a child's development, that acceleration is not desirable. Elkind mentions an optimal time for learning--the problemmatic concept of readiness. Those who align with the Piagetian camp do not wish to intervene to bring the child to learn what the child is not "ready" for. The opposite view is posed by the Skinnerean behaviorists and Bruner (1960) who insists that ". . .the foundations of any subject may be taught anybody at any age in some form (p. vii)". Is there a middle ground or synthesis? From a practical, clinical point of view, the doctrine of postponement seems untenable: as for readiness to occur, the child and therapist might as well be "waiting for Godot".

The child who has the gross motor skills of half his age and does these skills in a jerky, unrythmic fashion needs considerable help before he will look like a normal child to his peer group. Our approach to children with gross motor deficits (Patrick, 1974) has been based upon assessment, individual remediation, small groups using related skills at previously achieved levels, and encouragement of independent reliance upon the child's own integrative mechanisms for self-correcting feedback. Our controlled 24 hour milieu setting is highly structured, even to the point where free play often has to be scheduled. With a high ratio of staff to children, we can try seriously to apply theory to practice. Regardless of the importance of theory for generating experimental questions, I would argue that the development of methods and techniques is largely a function of the intuitive skill and ingenuity of the

individual-craftsperson-therapist. Even Piaget's carefully worked out theory of cognitive development does not tell us how to modify acquired strategies in a child suffering some form of abnormal behavior or motor pattern.[3]

3. *Mental retardation*

Perhaps what limits the applicability of Piaget's theory in the previous two problem situations is their common need for re-education or rehabilitation. A maladaptive behavior was to be extinguished while an adaptive behavior was to be substituted. Most of the therapy involving severely and profoundly retarded children is habilitative. most often, new skills are being taught where no competing behaviors exist. In this situation Piaget's framework of developmental cognitive stages generates clues as to what the progressive steps are which the child must take in order to achieve higher levels of adaptive functioning. It is of little importance for the clinician whether these stages are discrete, lock-step entitities or whether they are continuous processes ebbing and flowing in the irreliance upon previous schemata. Despite this type of theoretical fit, the concern over readiness and maturation remains in habilitative cases.

Since the mentally retarded child has significantly more communication-expressional problems, it becomes even more difficult to assess just how the child is reacting to the learning experiences presented to him. With the lack or absence of verbal accounts, the semi-clinical interview becomes inappropriate with the mentally retarded. Nevertheless, the therapist can watch for signs of non-verbal affective expression. As an example, in climbing activities we look for signs of tension in the facial and large muscle groups and, of course, overt non-compliance.

Working with the retarded seems to place the therapist in greater control of the choices within the environment, the tenor of Piaget's writing would seem to suggest that children should have as much freedom to manipulate, choose, and act as possible. However, severely retarded children are rarely self-actuating. They are not high rate assimilators or eager new information processors, they do not have sufficient play skills. How do you teach someone to play?

The signs of play, its overt behaviors, at beginning levels are repetition, cyclical activities, and acquisition of new skills. Ellis (1973) characterizes play as adaptive behavior which generates a tendency for the organism to engage in the elements in the environment which are changing. This gives immediate benefits in satisfying the need for stimulation and yields the behavioral flexibility to allow the individual to deal more satisfactorily with future unknowns. Ellis' view is generally consonant with Piaget (1962) who made a complete explication of the play in his own children. Piaget traced the stages of play from late in the first year through the peak of imaginative play at the third and fourth years through a decline in symbolism and fantasy and a progressive socialization and reality orientation as the children matured through puberty.[4]

If severely retarded children lack the self-actuating need for novel stimulus which is a prerequisite for play, it would seem that therapeutic intervention can not afford a Piagetian approach which depends upon play to develop the purely assimilative function. Therapists must offer opportunities for child determined play, but given the lack of that response, must provide structured even manipulated experiences in places of the play experience. Perhaps nothing can

take the place of the play experience. Yet, children who do not play, need experiences which most nearly approximate it.

CONCLUSION

The applicability of Piagetian theory to therapeutic intervention in gross motor and affective dysfunction was found to have limitations and liabilities. Problemmatic were Piaget's conception of learning as a function of development. This implies that the stages of development can in part explain learning and similarly, that the learning cannot explain development. Specifically, Piaget calls into question behavioral therapy, attempts to accelerate readiness to learn, and efforts to teach for creativity.

Piaget's methodology was found to be eminently applicable for purposes of therapeutic intervention. Four aspects of his methodology were generally acceptable: (1) the client centered approach, (2) the semi-clinical interview, (3) the non-defectivity of child response, and (4) that knowledge develops from action.

Three examples were given in a way of summarizing the applicability of Piaget's works to the concerns of activity therapists or special physical educators: (1) therapy for childhood autism, (2) rememediation for gross motor dysfunction, and (3) habilitation for mental retardation.

Despite the theoretical limitations of Piaget for therapeutic intervention, the strength of his methodology for dealing with children and his description of developmental trends in human potentiality provide a useful source for professional application in therapeutic recreation and special physical education.

FOOTNOTES

[1] Thus, as Easley point out Piaget can neither take the side of genetic control of intellectual ability (as Jensen and Shockly) nor the side of the environmental control of intellectural ability (as do many behaviorists).

[2] The interested reader may wish to look into the recent work of Seymour Fisher, *Body Consciousness: You Are What You Feel*. Englewood Cliffs, New Jersey: Prentice Hall, 1973.

[3] Similarly, the generally agreed upon idea that rewards affect performance does not tell us what will be an effective reward in specific instance.

[4] It may be well to note that play as Ellis defines it does not cease during the early adolescent years as Piaget may be interpreted as indicating. This points out a contradiction worth pursuing, for, if Piaget and Ellis hold compatible theories at earlier stages, how does one explain the apparent rift at adolescence? Ellis suggests that the more developmentally mature individual plays in increasingly covert (mental) proportions, while Piaget is silent about play past puberty.

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PIAGET AND SPECIAL PHYSICAL EDUCATION

Reinhard Bergel

INTRODUCTION

In understanding Piaget's view on psychological theory, which centers in intelligence, and the principles of Special Physical Education, we must develop a concept that attempts to combine both to a certain degree. The virtures and faults in such conception will not be discussed here. Before I proceed to present some of Piaget's major concepts in relation to Special Physical Education, a word should be said concerning Piaget's methods of research. Piaget's clinical observations are usually made in an informal manner with little experimental control, on a more or less opportunistic basis. Children were given simple problems to solve, depending upon their degrees of readiness. In spite of this informality of method his observations have been numerous and his insights have been fertile. The outcomes, however, are in the form of only partially tested hypotheses, to say the least. Fortunately, other investigators are replicating his less informal studies. Sometimes his conclusions are supported, sometimes not.

STATEMENT OF THE PROBLEM

The term Special Physical Education, is relatively new, and is mainly used as an umbrella term for remedial, developmental and adapted physical education. The basic principles of it should be to improve and maintain motor efficiencies of the body through physical activities. Instructional programs include to a great deal the rationale of perceptual-motor programs, which have as their ultimate goal the improvement of academic achievement. Although objectives of many programs include the improvement of body image, directionality, spatial orientation, coordination, etc. there is a subtle or open implication that enhancement of the aforementioned qualities is somehow, related to improved scholastic achievement. The most recent surge of interest in perceptual-motor programs has been closely allied to the problem of learning disabilities. Perhaps the focus of the recent interest stems from a single article (Oliver, 1958) that claims significant improvements in IQ after a period of exposure to a program of physical activity for retarded youths.

A logical outgrowth of the child study reports of several decades ago was that intellectual functioning was an outgrowth of earlier established motor functioning. Longitudinal observations revealed that the infant engaged in random exploration of the environment before purposeful behavior became evident. Verbal activity was established long after the child was capable of making visual, auditory or tactile discriminations. It is therefore not surprising that the motor base of intellectual development received strong support from those conducting investigations on children (Gesell 1946; Goodenough & Brian 1925; Piaget 1947). Up to this time relatively little is available that illustrates the relationship between childhood motor behaviour and intellectual strategies in a form of active tasks that involve total body movement. The relationships between cognitive abilities, motor abilities and physical characteristics has been established in two ways one, through empirical evaluation of correlations

between intellectual efficiency and motor performance; two, through the generally positive results of above mentioned programs. From these results we cannot draw conclusions to what extent the relationships take place in a direct causality, or if it is caused by a third variable.

There are numerous analyses of early childhood static-motor development and sensori-motor intelligence actions. Their implications, however, are very much limited on rather general statements about the body-soul unit of development and the continuous derivation of the conceptual intelligence from the sensori-motor intelligence. Conditional motor sequences are often globally interpreted by the issue of ontogenetical succession. This is in agreement with the meaning of the sensori-motor period for the subsequent cognitive processes. The conditions, however, for cognitive development in childhood motor performance remains unknown as long as the developmental stages and periods are separately analyzed. Piaget has, in his writings, presented considerable detail about the development of cognitive processes from the infantile, sensori-motor stages to the mature, reflective stage. Of primary interest in Piaget's work was that he concerned himself most with the mechanisms which propel, or foster growth from stage to stage. The question about such conditions becomes practically relevant in our work with the handicapped individual. His motor development cannot proceed in a normal characterized way because he is handicapped in his movement capacity. Only when these conditions are recognized, it is possible to work in a differentiating way on the basis of educational and psychological support of handicapped individuals.

Perhaps the most important single proposition that we can derive from Piaget's work is that children learn best from concrete activities. Movement activities may affect the child's proficiency in tasks which require thought, observation, concentration and perceptual abilities. We realize from practical experiences regarding the cognitive development of physically handicapped, that the physical handicap is considered as motor deprivation. But it could be precipitately assumed that only descriptive analyses of physically handicapped children of their development from birth on can give any information about to what degree the motor impairment can keep up with the cognitive development. The development of these children is not only very often impaired by secondary problems like parental attitude towards the educational achievement of their child, reactions of the peer group, and environmental barriers, but also in the large group of children with cerebral palsy, for instance, we find a damage of the brain substance, which still does not reveal very much about its effects.

From the late 1950's until the present time, descriptions of various evaluation procedures and movement programs have been the subject of a great many books and journals, and have attracted the attention of a large number of parents and educators. Yet, an evaluation of the motor behaviour of physically handicapped children is not very fruitful as long as it is not standardized, which observation criteria are significant in order to refer to cognitive development. Therefore this matter remains in theoretical structure until valid measurement procedures are developed. Despite the measurement difficulties, the findings of the development of various physically handicapped children are useful in order to be indicative for a theoretical analysis. They explain very clearly how a

normal motor development cannot be a particular condition for the cognitive development. The argument against such an opinion is that there is a plurality of severely handicapped with motor impairment starting at birth that nevertheless indicate average and above average intelligence performance. The often mentioned derivation "understanding results from prehension" must be refused as long as one understands grasping behaviour as the normal grasp. The derivation is disproved by research findings on children with limbs missing from birth or early infancy. The early incapacitation frequently limits the child's opportunities for play and other social contacts and greatly restricts the development of satisfactory social growth. Research data on thalidomide children revealed that there is no significant connection between the damage of the upper extremities and the intelligence of the youngsters (Sievert 1968; Schonberger 1971). The effect of motor impairment on intelligence performance is obvious and sometimes serious if all the extremities are involved (Asher & Schonnel 1950; Dunsdon 1952; Haeffelinger & Pfefferle 1972; Schonberger 1972). The lack of physical activity in the lives of the youngsters has detrimental physiological and psychological consequences. To achieve satisfactory adjustment the handicapped individual must compensate for his lack of success in physical performance i.e. compensate by achieving superiority in intellectual tasks.

MOTOR BEHAVIOR AND COGNITIVE ACHIEVEMENT

Piaget's constructive theory offers perhaps the most consistent approach in regard to the developmental continuity of the child's activity and his manipulation and exploration of objects, which is conceptual thinking. Understanding is continuous activity of the individual deriving from the biological function of simple sensori-motor assimilation concepts, which lead through their coordination to deep intuitive structures and internalized symbols which become grouped reversible operations after an adaptation process. From the aspect of cognitive theory we see that Piaget's work on the continuity from the biological function of performance to logical functioning of their operations is completely preserved by the adaptation process.

Piaget indicated that at the earlier sensori-motor stages cognitive functioning is completely dependent upon what is physically present and can be physically manipulated. With the development of "inhibitory powers" the full behaviour sequence becomes abbreviated to a gesture signifying perceptual recognition of the object and representing the typical action pattern demanded for coping with that object. This gesture, in turn, can be seen to become further reduced to patterns of muscular tension. After much repetition, even this tension is brought down to practically immeasurable proportions and spoken of as images formed in the "mind". It is through this process of internalization and the combining of schemata (through reciprocal assimilation) that thought processes become relatively autonomous of the concrete situation and become the mobile, efficient vehicle of problem solving that it is. These considerations imply a close connection between thought, action, and tension. Psychological analysis, however, reveals a boundary between sensori-motor intelligence and preconceptual thinking, which just cannot be explained by the methodological

change from cousitical lonitudinal observations (Piaget, 1969; 1950) to clinical experiments (Piaget 1969, 1971). When Piaget defined intuitions, symbols and furthermore operations as internalized actions, he offered only a vague indication of his understanding of "performance". The improvement in motor performance is essentially characterized by the selective restrictions to movements strictly necessary to make action effective.

As examples Piaget mentioned adjusting movements to fit the properties of objects, and thus indicate that he has understood them at the level of motor responses, i.e. the child can move these objects, or lift them up, turn them around. Regarding the structural assumptions of these movements, they often can be partially associated with sensori-motor intelligence (to turn around, to shift), pre-conceptual thinking or with operational thinking. In his analysis of sensori-motor intelligence Piaget offers a variety of observations of sensori-motor activities. Although the notion of performance and its basic concept is not clearly defined it is sufficiently explained by the assimilation hypothesis. The mechanism of "reciprocal assimilation", involves the concept that if independent behavioural patterns, or schemata, repetitiously recur together they will, mainly on the basis of their common elements fuse together (assimilate each other) into one superordinate schema. To illustrate: at an early stage various reflex behaviours, such as thumb sucking, and grasping objects which stimulate the palm of the hand, become fused and lead to that common form of organized activity whereby all the objects an infant comes to grasp get carried to the mouth for investigation.

Thus, in the description of his observations Piaget only insufficiently differentiated between the motor and sensori portion with the assimilation plans (there is a grasping plan as well as a vision or auditory plan existing), but Piaget always emphasized the meaning of motor behaviour for structural development; it causes a transformation of the perceptual area with the consequences that each area is understood as a total of relations which are determined by motor behaviour.

IMPLICATIONS OF PIAGET'S WORK, METHODS AND TECHNIQUES OF INSTRUCTION

While Piaget has not been mainly concerned with schools, one can derive from his theory and retain general principles which may help and support educational procedures. We must be cognizant that educational objectives are different for youngsters with a handicapping condition in comparison to non-handicapped ones. Well planned physical education programs can make one of its most significant contributions to the benefit of the handicapped in the teaching of appropriate motor skills which will enable them to participate with pleasure in active games and sports. Motor performance is understood as a variation of the sensori-motor area connected with the variation of motor behaviour. In opposition to the "absolute movement" motor performance has a transitional character as it is included in Piaget's assimilation theory. According to that, the implication of motor behaviour on cognitive development is to be recognized on the grounds that can be used to influence the environment through transformation by means of spatial and conditional changes of object which also

include the child's body. In this respect childhood motor performance as a cognitive adaptation process does not require any general fixed motor sequence.

Piaget has analyzed childhood motor performance only during the sensori-motor period. It is possible to indicate that he grants in his work on internalization of behaviour an implicit position to childhood motor performance in the periods of preconceptual and vivid thinking. In Piaget's views, one of the major sources of learning, if not the most essential one, is the intrinsic activity of the child. At the end of his sensori-motor stage the child is able to internally anticipate his activities before the execution. The principle that learning occurs through the child's activity suggests that the teacher's major task is to provide for the child a wide variety of potentially interesting materials on which he may perform (Cratty, 1973).

If the solving of a task requires an internal anticipation, then in executing the performance the child is forced to "decentralize" otherwise he could not accomplish the task. This is an important factor in the accommodation process that Piaget has not explained. The fact that a child by himself solved the answer, by himself discovered the response, reflects the special dimension of internalizing data (Piaget, 1958), which creates a more intimate relationship between the child and the subject matter. With the start of operational thinking, motor performance is only used as a tool that has no more repercussion on the structural development but instead exclusively on the contents of cognition. The child must act on things to understand them. Intelligence reinforcing effects of movement education in the school requires a different explanation that hypothesizes an indirect motor behaviour-cognition relationship. For these reasons a good activity program should encourage the child's activity, and his manipulation and exploration of objects. Motor training programs that promote activities for memory and imagery, symbolization, categorization, language communication, conceptualization, evaluation, etc., can exploit the child's potential for learning, and permit him to evolve an understanding of the world around him. The principle of adapted teaching methods and techniques requires a considerable reorientation of beliefs and philosophies concerning education. Piaget felt that it is the teacher's job to get the child to act on both physical and mental levels. These actions represent real knowledge, far more than imposed facts or concepts.

CONCLUSION

There exists significant evidence which demonstrates that some programs of motor education have improved a child's self-concept, to the extent that the child gains confidence in his ability to succeed in the classroom (Cratty, 1973).

Through a well organized physical development, success-oriented program of physical activity, a child is capable of achieving success that can be instant feedback enhancing the development of a child's self-image and self concept which in essence will contribute to the child's total physical and mental development. Piaget's contribution to the concept and principles of special physical education cannot be obtained from a text book per se. As already mentioned, we can derive from his theory general educational principles that have been expressed by the "progressive education movement" for many years.

Piaget's contribution should stimulate and provide the teacher with a sound basis for a program that assures promising success.

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